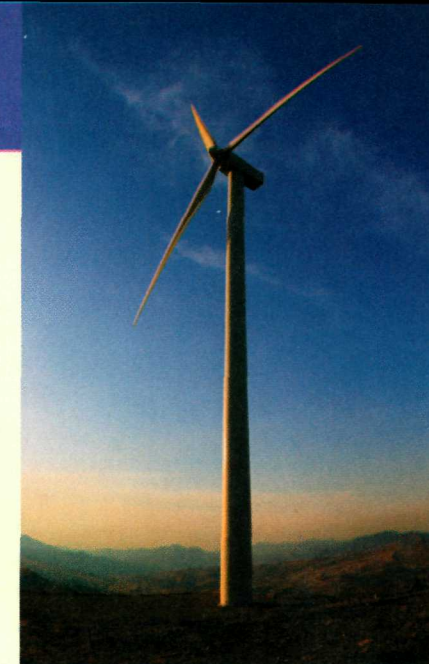


KEY TERMS

cognitive ability test	overt integrity test	situational interview
cognitive test battery	personality-based integrity test	unstructured interview
knowledge test	emotional intelligence (EI)	assessment center
psychomotor abilities	emotional intelligence	work sample test
screen out test	quotient (EQ)	situational judgment test
screen in test	individual assessment	
self-presentation	structured interview	

MODULE 3.5

Special Topics in Assessment



Incremental Validity

In the preceding modules, we have described quite a few tools that might go into the assessment toolbag. Until recently, assessment research often took on the flavor of a competition—which tool was better, a paper and pencil test of “g” or an interview? One study reported that “the validity” of a test of general mental ability was $+0.35$, whereas another study reported that “the validity” of an interview was $+0.46$, suggesting somehow that an interview is a more valid assessment device. Similarly, one might explore the differences in validity between a personality test and an interest test, or a work sample and a paper and pencil test. These are misleading questions for a number of reasons. First, we cannot answer these questions without answering another question: Better for what? Predicting satisfaction, or performance, or tenure, or management potential? Another reason why the questions are misleading is their implication that one is forced to choose a single instrument rather than developing a battery of assessment devices. Finally, the questions were misleading because they mixed test content with test process (e.g., test of “g” versus interview) (Sackett & Lievens, 2008).

In the past few years, dozens of studies have purported to demonstrate the value of one or another device or test. Many of these studies compared the device of interest to another device. In addition, studies examined the predictive validity of particular combinations to demonstrate the added, or incremental, value of combining two devices. Thus, a study might show that the validity of a paper and pencil test of general mental ability was found to be $+0.35$, but when it was combined with an interview, the validity of the two measures combined was $+0.51$. Thus, one might conclude that the value of the interview is incremental; that is, it added to the validity of the paper and pencil test. Examples of **incremental validity** studies include:

- Personality measures and biographical data (McManus & Kelly, 1999).
- Biodata and general mental ability (Mount, Witt, & Barrick, 2000).
- Personality measures and assessment centers (Goffin, Rothstein, & Johnston, 1996).
- Cognitive ability, interviews, and biodata (Bobko, Roth, & Potosky, 1999).
- Personality measures and mental ability (Bing, Whanger, Davison, & VanHook, 2004; Kanfer & Kantrowitz, 2002).

Incremental validity The value in terms of increased validity of adding a particular predictor to an existing selection system.

- Situational judgment and cognitive ability/personality/job experience (Chan & Schmitt, 2002; Weekley & Ployhart, 2005).
- Situational judgment and cognitive measures (Lievens et al., 2005).

These studies point to an important principle: In assessment the issue is not *which* tool to use, but what *combination* of tools to use for the greatest predictive ability at the lowest cost.

As we saw earlier in the chapter when we discussed individual differences, and as we will see in greater detail in the chapters covering performance theory and prediction, industrial behavior is very complicated. It involves technical tasks as well as social ones. Successful performance in virtually any job depends on many different KSAOs. As a result, it makes little sense to limit the toolbox to one and only one tool. As Maslow said many years ago (1971), when the only tool in your bag is a hammer, you tend to treat everything as if it were a nail. As we continue to gather information about the incremental validity of various combinations of assessment tools, we will be better able to make practical recommendations about the most fair and effective assessment programs, as well as what tests and procedures might act as substitutes for other tests and procedures.

Biographical Data

It is common for organizations to gather personal information from applicants for positions. The best example is the type of information collected on an application blank: information about previous jobs, education, and specialized training. This type of information can also be used to predict job performance; collecting it can be thought of as a “test” if the collection method is standardized, the scoring is objective, and the sample of behavior examined is reasonable. This type of information has been variously labeled personal history, life history, biographical information, or—the simplest label—**biodata**.

In the 1950s and 1960s, biodata predictors were based less on theory than statistics. If a particular piece of information (e.g., educational accomplishment) could be shown to predict success, it was included in an application blank. If no relationship could be found, it was not included. William Owens pioneered what has been called the *rational approach* to the use of life history data for the prediction of success (Mumford & Owens, 1982; Mumford, Snell, & Reiter-Palmon, 1994; Mumford & Stokes, 1991). Instead of simply looking at statistical relationships between individual history information items and success, Owens identified broader life history factors as a way of arranging all of the hundreds of pieces of information that could be gathered about someone. The underlying model for this type of biodata instrument is the **ecology model** (Mumford, Uhlman, & Kilcullen, 1992). In its simplest form, this model proposes that the events that make up a person’s history are neither accidental nor random. They represent choices made by the individual to interact with his or her environment. As a result, these choices can signal abilities, interests, and personality characteristics. Thus, personal history data can be used as a surrogate or as an addition to other assessment information. As Figure 3.12 shows, there are many potential influences on the situations and actions that individuals choose from all available situations and actions. These precursors of situational choice and actions are the focus of biodata instruments. One implication of the ecology model is that as individuals mature (i.e., enter different life stages such as college, first job, parenthood, career), the predictability of biodata items might change. Dean and Russell (2005) have demonstrated such an effect.

Mael (1991) has suggested some characteristics of biodata items that distinguish them from other types of assessment, such as personality tests. Guion (1998) has summarized these characteristics as follows:

Biodata Information collected on an application blank or in a standardized test that includes questions about previous jobs, education, specialized training, and personal history; also known as biographical data.

Ecology model Underlying model for life history biodata instruments. Proposes that the events that make up a person’s history represent choices made by the individual to interact with his or her environment. These choices can signal abilities, interests, and personality characteristics.

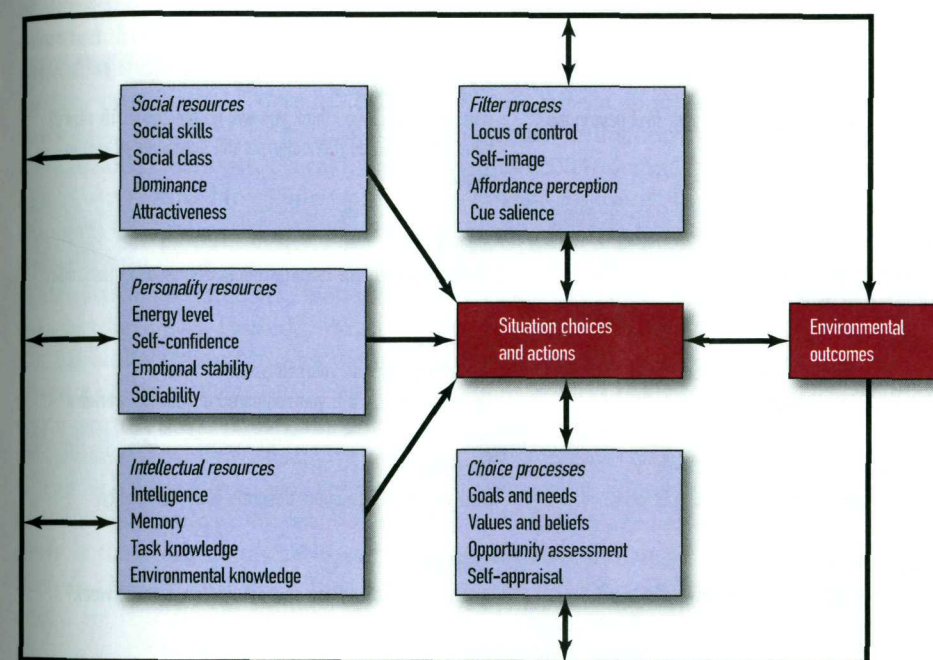


FIGURE 3.12 Construct Categories Drawn from an Ecology Model

SOURCE: Mumford & Stokes (1991).

1. *Historical*. The item refers to events that have already occurred or are occurring rather than future, hypothetical events. For example, “Do you intend to develop computer skills?” is not a biodata item, but “How many times did you access the Internet in the past week?” is.
2. *External*. The events are observable and may involve others. They are not events that occur solely in one’s own head. This would exclude items of the “how did you feel . . .” variety. An example of an external item might be, “Have you ever been suspended from your job without pay for disciplinary reasons?”
3. *Objective*. The events are factual and do not involve interpretation. For example, “I think my last boss disliked me” would not qualify as a biodata item because it attributes an attitude to the supervisor that he or she may not have had. An objective item might be, “How many training courses have you taken outside of your company in the past five years?”
4. *Discrete*. The event described is concrete, with a beginning and/or ending, rather than open ended. An example might be, “When did you receive your permanent teaching certificate?”
5. *Control*. The event describes an action over which the applicant had control. An example might be, “How many times have you applied for a promotional opportunity in your company in the past five years?”
6. *Relevant and noninvasive*. The event should have at least the appearance of job relatedness and avoid overly personal aspects of a person’s past. An example would be historical familial issues such as relations or income. “How many public presentations have you made in the past year outside of your company?”

Using these guidelines, Mael (1991) presented an illustration of acceptable and unacceptable biodata items (see Table 3.12).

In a later study, Mael, Connerly, and Morath (1996) identified four possible factors that determine whether a biodata item might be seen as invasive. Invasive items are those that might stigmatize someone, might remind the individual of traumatic events, were unduly intimate, or concerned religion.

TABLE 3.12 Examples of Good and Poor Biodata Items

<i>Historical</i> How old were you when you got your first paying job?	<i>Future or hypothetical</i> What position do you think you will be holding in 10 years? What would you do if another person screamed at you in public?
<i>External</i> Did you ever get fired from a job?	<i>Internal</i> What is your attitude toward friends who smoke marijuana?
<i>Objective</i> How many hours did you study for your real estate license test?	<i>Subjective</i> Would you describe yourself as shy? How adventurous are you compared to your co-workers?
<i>Firsthand</i> How punctual are you about coming to work?	<i>Secondhand</i> How would your teachers describe your punctuality?
<i>Discrete</i> At what age did you get your driver's license?	<i>Summative</i> How many hours do you study during an average week?
<i>Verifiable</i> What was your grade point average in college? Were you ever suspended from your Little League team?	<i>Nonverifiable</i> How many servings of fresh vegetables do you eat every day?
<i>Controllable</i> How many tries did it take you to pass the CPA exam?	<i>Noncontrollable</i> How many brothers and sisters do you have?
<i>Equal access</i> Were you ever class president?	<i>Nonequal access</i> Were you captain of the football team?
<i>Job relevant</i> How many units of cereal did you sell during the last calendar year?	<i>Not job relevant</i> Are you proficient at crossword puzzles?
<i>Noninvasive</i> Were you on the tennis team in college?	<i>Invasive</i> How many young children do you have at home?

SOURCE: Mael (1991).

Like other assessment instruments we have discussed, biodata instruments derive their job relatedness and value from the constructs they try to assess (e.g., cognitive ability, personality, experience, knowledge) and not from any magical properties of the format itself. Several studies have demonstrated that biodata items can improve prediction of success when added to other discrete assessment techniques such as the interview (Dalessio & Silverhart, 1994), personality tests (McManus & Kelly, 1999), and even general mental ability (Mount et al., 2000). But if one were to develop a comprehensive battery of devices including cognitive ability, personality, interest inventories, and job knowledge, it is not yet clear how biodata information would add to what is assessed by those other techniques. There are also some lingering concerns about the fairness of certain types of biodata items. For example, Whitney and Schmitt (1997) found that compared with whites, blacks were more likely to describe past experiences that emphasized “the maintenance or restoration

of long-standing traditions” and activities that were group rather than individually oriented. Even though the research was performed with college students, it certainly suggests that more research needs to be done in the area of ethnic and cultural influences on biodata instruments. There has been also some concern about whether biodata items are susceptible to faking, or at least **social desirability** influences in responding (Schmitt & Kunce, 2002). Schmitt, Oswald, and colleagues (2003) demonstrated that when the candidate was required to elaborate on various biodata responses, biodata scores did go down. But even though the scores changed, they seemed to change for everyone, since there was no reduction in the criterion-related validity of the biodata scores. Either people did not want to take the energy to elaborate, or everyone appears to claim experiences that they may not have had. Harold, McFarland, and Weekley (2006) suggest that there is less faking on biodata than on personality inventories because questions about the presence or absence of experiences (i.e., a biodata question) are less likely to lead to self-deception (I *was* a neurosurgeon for several years before going to work for Lowe’s) than questions about tendencies (I *am* very careful in my work). The researchers suggest that maximum validity can be obtained from biodata tests when the answers to the question appear to be verifiable to the candidate (i.e., the employer *could* check on the accuracy of the answer). The good news is that current research on biodata is considerably more theory based than it has been in the past (Mitchell, 1994). Once biodata instruments become more standardized and there is some agreement regarding what they measure most effectively, biodata may represent an attractive alternative to other available assessment devices.

Social desirability Desire to be appealing to others.

Grades and Letters of Recommendation

Employment applications, especially those for entry-level positions, often solicit high school and college grade point averages. In spite of their popularity, there is little careful research to support the use of grade point averages (GPAs) as a predictor, independent of measures of general mental ability, personality, or interests. In addition, substantial adverse impact against minority applicants appears to be associated with the GPA (Roth, BeVier, Switzer, & Schippmann, 1996; Roth & Bobko, 2000). There is some evidence that GPA and positive letters of recommendation can predict who will be *offered* a job, but not who will be successful in that job (Marshall, 1985).

Berry, Gruys, and Sackett (2006) went a step beyond grades, and looked at educational accomplishment (i.e., how many years of high school or college a person had attained). In particular, they were interested in whether educational attainment could serve as a proxy for cognitive ability. Intuitively it would seem that, in a very general sense, more intelligent people attain high levels of education. We caution to add (as do the authors) that we are only considering the *correlation* between cognitive ability and educational attainment. You can just look around your family and friends and see that many intelligent people either do not have an interest in or an opportunity to pursue higher levels of education. Similarly, there are many people with advanced degrees who are not necessarily the sharpest knives in the drawer. Nevertheless, the researchers were curious to see if levels of educational attainment might substitute for a test that measures cognitive ability. This would be useful for employers since gathering and verifying educational information is often much easier and cheaper than administering, scoring, and interpreting a test. The analysis showed that, even though the most *accurate* measure of cognitive ability was a test, if an employer were to set as an educational threshold the successful completion of at least one year of college, this educational requirement could act as a reasonable proxy for a cognitive ability test score. The researchers recommended that employers might want to set one year of college as a screen for those who would be permitted to take a test of

cognitive ability (i.e., make it a minimum qualification for application), thus assuring that those who took the test would already be in the upper ranges of cognitive ability. They also found that if the “one year of college” hurdle were used *instead* of the test of cognitive ability, adverse impact against ethnic minority applicants would be reduced. Many employers would see the tradeoff between lessened adverse impact at the risk of less complete information regarding “g” as a good one. Not all jobs require high levels of “g,” and for some openings, a surrogate for “g” might work just fine.

Similarly, even though employers almost always ask job applicants for references or letters of recommendation, there has been little serious research on the validity or fairness of these devices (Loher, Hazer, Tsai, Tilton, & James, 1997). Since the threat of litigation from disgruntled rejected applicants looms large in the minds of many recommenders and reference sources, they are unlikely to provide negative information. In addition, without a great deal of imposed structure, and a clear understanding of the information base of the reference source, the information provided is often irrelevant, uninterpretable, or both.

Minimum Qualifications

Above, we indicated that the GPA is of largely unknown value as a predictor of job success and may have some vulnerabilities with respect to adverse impact. But that does not mean that education as a construct is of no value in a selection program. As we saw above (Berry et al., 2006), in certain circumstances, educational accomplishment can function as a surrogate for cognitive ability. In public sector employment, there is a widely applied concept known as minimum qualifications (MQs). MQs usually involve a combination of education and experience and are used to make sure that individuals who wish to be considered as legitimate applicants have the prerequisite formal training and/or experience to assume a position without further training or experience. That is why they are called “minimum.” That does not mean that the candidates will not be asked to complete additional assessment exercises such as tests or interviews. What it does mean is that applicants who lack the stated MQs will not be considered for subsequent assessment for the position.

Typical MQ statements appear in Table 3.13. As you can see, MQs vary widely depending on the position in question. As you can also see, some MQs can be satisfied in several ways, which makes them less restrictive. Since MQs are selection devices in every sense of the word, they must be developed and validated just like any other selection device. The research on MQs is sparse (Levine, Maye, Ulm, & Gordon, 2006), but a recent demonstration of how MQs might be developed and validated provides the historical context, the methods that can be used, and the legal defensibility of MQs (Buster, Roth, & Bobko, 2005). Buster and colleagues suggest some principles for the development, use, and defense of MQs. These include:

- 1. Base them on a job analysis.
- 2. Direct them with a newly appointed job incumbent in mind.
- 3. Think about alternatives to formal course requirements that permit multiple avenues for meeting the MQ requirement.

Since MQs are used so frequently by public sector employers, particularly for promotional positions, they will continue to be challenged legally. As a result, particular care must be taken in their development.

Useless Assessment Practices: Graphology and the Polygraph

This section will be quite short. There are two selection practices, used largely by employers in countries other than the U.S., that are useless. We could devote several pages to

TABLE 3.13 Exemplary MQ Statements

<i>Communications Technician II</i> High school diploma/GED equivalency and 4 years of experience in the repair of two-way radios. Graduation from an accredited technical/trade school in electronics or a closely related field and 2 years of experience in the repair of two-way radios.
<i>Civil Engineer—Construction Area</i> High school diploma/GED and 5 years of civil engineering experience in the construction area performing one or more of the following duties: project inspection, designing, drafting, or reviewing plans, contracts, and specifications, material calculations, and recordkeeping (checking contractor payrolls) and related duties. High school diploma/GED and 8 years of civil engineering experience, 4 years of which must be in the construction area performing one or more of the following duties: project inspection, designing, drafting, or reviewing plans, contracts, and specifications, material calculations, and recordkeeping (checking contractor payrolls) and related duties. High school diploma/GED and 8 years of experience as an engineering assistant in any work area. Bachelor’s degree in Civil Engineering or Civil Engineering Technology.
<i>Senior Real Property Valuation Analyst</i> High school diploma/GED, completion of Appraisal Institute courses 110, 120, 310, and 510, and 7 years right of way specialist/real property valuation analyst experience with at least 3 of those years in real estate appraising. Four-year degree, completion of Appraisal Institute courses 110, 120, 310, and 510, and 3 years in real estate appraising.

demonstrating why they are useless, but we would rather devote those pages to practices that have some value. For this reason, we have placed the material showing that they are useless on the text website. The two practices that make our “useless” list are polygraphs (electronic lie detection) and graphology (handwriting analysis). Although Gatewood and Feild (2001) estimate that 2,500 U.S. firms use graphology as a screening device, we are skeptical of that estimate. The polygraph is permitted only in certain job sectors, but is useless even in the job sectors for which it is permitted (e.g., screening for national security). As we describe on the text website, the research showing the uselessness of these practices is substantial and compelling. So let’s move on.

Drug and Alcohol Testing

There are several issues to address with respect to drug and alcohol testing in the workplace. The first is how acceptable the practice is to employees and prospective employees. As we will see in Chapter 11 when we consider fairness issues related to assessment, this type of screening is considered more acceptable by the public at large, as well as by employees, when the job in question involves the possible risk to the public (Murphy, Thornton, & Prue, 1991; Paronto, Truxillo, Bauer, & Leo, 2002).

The second issue relates to the legality of this type of screening. The courts have not yet finished deciding which practices impinge too greatly on an individual’s right to privacy. Courts have upheld the right of railroads to test for the presence of drugs following an accident. In addition, it has been judged acceptable to test for drugs when screening applicants for drug enforcement posts with the federal government (Cascio, 1998a, b). In many areas of the private sector, drug screening is common for new hires. Harris (2000) reported that as many as two-thirds of large and medium companies screen new hires and

TABLE 3.14 Ways to Enhance the Defensibility of a Drug-Testing Program

To avoid legal challenge, companies should consider instituting the following commonsense procedures:

1. Inform all employees and job applicants, in writing, of the company's policy regarding drug use.
2. Include the policy, and the possibility of testing, in all employment contracts.
3. Present the program in a medical and safety context—that is, state that drug screening will help improve the health of employees and will also help ensure a safer workplace.
4. Check the testing laboratory's experience, its analytical methods, and the way it protects the security and identity of each sample.
5. If drug testing will be used with employees as well as job applicants, tell employees in advance that it will be a routine part of their employment.
6. If drug testing is done, it should be uniform—that is, it should apply to managers as well as nonmanagers.

SOURCE: Adapted from Cascio (1998b). © 1998 by McGraw-Hill. Reprinted by permission of The McGraw-Hill Companies, Inc.

as many as one-third of these companies screen current employees for drugs. With respect to alcohol use, current laws permit the random testing of individuals who work for commercial trucking companies, the aviation and rail industries, and mass transit; as well as nonrandom testing after an accident. Cascio (1998b) suggested several steps that an employer might take to enhance the defensibility and acceptability of a drug-testing program (see Table 3.14). In addition to the courts, employees and the public in general are very concerned about maintaining procedural justice when implementing a drug-testing program. In 1988 the federal government passed the Drug Free Workplace Act (DFWA) as a more affirmative approach to the problem of drugs in the workplace. As a result of DFWA, all federal contractors with contracts worth more than \$25,000 are required to establish a drug-free policy. For nongovernment contractors, the DWFA allows for reduced worker compensation insurance premiums for employers, as well as access to an information network regarding drug testing (Gutman, 2000).

Extensive literature exists on the effects of alcohol and drugs on various aspects of physical and mental performance. As examples, it is well known that alcohol will slow reaction time, impair reasoning ability, induce drowsiness and clumsiness, and have a generally dulling effect on various senses. The same is true with various drugs, both illegally obtained and prescribed. Thus, from the performance perspective it seems clear that such substances will lead to lowered performance in a wide range of physical and mental tasks. But that is a "here and now" issue. Few would disagree that if an individual can be classified as intoxicated due to alcohol or drugs, he or she should not be permitted to engage in any work activity that might bring harm to the person, a co-worker, or the public. But the more intriguing question is whether a past history of use predicts future behavior. There is some evidence that drug use affects absenteeism and involuntary turnover. Normand, Salyards, and Mahoney (1990) reported that 5,500 applicants for postal positions were given drug tests. After 15 months, the new employees who had tested positive for drugs at the time of hire had an absenteeism rate almost 60 percent higher than those who had tested negative. In addition, almost 50 percent more of employees who had tested positive were fired during the 15 months than those who had tested negative (many for excessive absenteeism). Harris and Heft (1993) reviewed the drug-testing programs of large American companies and concluded that the outcomes most commonly predicted were absenteeism and involuntary terminations. But some have raised the issue of cause and effect. Galaif, Newcomb, and Carmona (2001) present evidence suggesting not only that drug problems lead to job instability, but also that job instability predicts later drug use. As we will see in subsequent chapters, both job instability and drug (and possibly alcohol) use may be tied together by a third variable—personality.

The problem of drugs or alcohol at the workplace must be kept in perspective. Most estimates suggest that fewer than 4 percent of applicants, and only 2 percent of incumbents, will test positive for drugs. But this may be an instance on which a mean or average does not tell the entire story. In a recent survey study (Frone, 2006), it appeared that two specific occupational groups were more likely than others to experience high levels of illicit drug use: (1) arts, entertainment, sports and media; and (2) food preparation and serving occupations. In these groups, the impairment level varied from 7 percent to 28 percent! But even "low-risk" occupational groups cause concern. At 10:30 a.m. on July 1, 2002, both the pilot and the co-pilot of an America West flight were stopped before they were able to take off in a jet bound for Phoenix from Miami with 124 passengers on board. Each had a blood alcohol level that indicated impairment.

Given these concerns, why not simply test all employees all the time? Isn't that the safest policy? Perhaps it would be, if we could have perfect confidence in the accuracy of those tests. But large numbers of false positive indications (a person who fails a drug screen urinalysis who then tests negative using a different and more sophisticated protocol) have undermined confidence in the results of most mass administered drug-screening programs. As Harris (2000) suggested, these false positives come from sloppy procedures, inaccurate tests, or both. There are alternative types of drug tests, particularly those called immunoassay tests, that are considerably more reliable (Harris, 2000), but they are often prohibitively expensive for the employer. Unfortunately, the tests and testing procedures are outside the expertise of the I-O psychologist. What we can do is identify the performance areas most likely to be affected by the use of drugs or alcohol, and suggest occupations or jobs where such testing makes most sense.

Computer-Based and Internet Assessment

Virtually every commercial test available in paper form is also available on the computer. Many are also available on the Internet, allowing for direct transmission and scoring of the tests. This is a win-win situation for the employer and the applicant. It reduces time and effort for the applicant, and it permits the employer to process large amounts of data in very sophisticated ways in order to make selection decisions. It also cuts down on the time it takes to inform applicants of their status in the hiring sequence. Via the Internet, an employer can administer a test worldwide in a matter of minutes; a candidate can receive a test score and an interpretive report within *seconds* of completing a test; a test can be revised in minutes at little cost; and scoring errors can be almost completely eliminated from the testing process (Naglieri, Drasgow, et al., 2004).

The variety of tests that can be presented on a computer platform is almost without limits. One might test for cognitive ability, personality, interests, and even psychomotor abilities. In addition, it is possible to present work samples, situational judgment tests, and very sophisticated and complex interactive cognitive tasks. The use of web cameras also permits some limited interpersonal testing, although there are still some elements of one-on-one interaction that are impossible to simulate by means of the computer. Aguinis, Henle, and Beaty (2001) provide fascinating examples of virtual reality technologies for assessment. We have presented a sample of these in Table 3.15.

The topic of computer and web-based interaction brings up an often asked question regarding computer-based test presentation: Are we measuring the same thing as we are with a paper and pencil test or interview? The answer is, yes and no. For personality tests, Salgado and Moscoso (2003) present data showing not only that the psychometric properties of the tests in the two modalities are equivalent, but that test takers actually prefer the Internet medium to the paper and pencil format. Ployhart, Weekley, Holtz, and

TABLE 3.15 Illustrations of Potential Use of Virtual Reality to Assess Specific KSAOs *vis-à-vis* Traditional Techniques

KSAO/POSITION	TRADITIONAL SELECTION TECHNIQUE	VIRTUAL REALITY SELECTION TECHNIQUE
Job Knowledge/Civil Building Inspector	Paper and pencil knowledge test: License or Certification listed on résumé/application	HMD: Move through virtual building and identify code violations
Skills		
Communication and Interpersonal/Manager	Assessment center in-basket	BOOM system: Interact with virtual subordinates
Handling of Hazardous Materials/Hazardous Materials Clean-up Team Member	Situational interview	HMD and data glove: Clean up hazardous materials at virtual accident scene
Abilities		
Cognitive: Visual-spatial/Mechanical Engineer	Paper and pencil ability test	Desktop system: Manipulate 3D job-relevant designs or models using 3D mouse
Psychomotor: Finger Dexterity/Manufacturing Position	Purdue Pegboard	Desktop system and data glove: Manipulate small virtual objects
Physical: Strength and Stamina/Firefighter	Simulation/obstacle course	CAVE system: Carry equipment in virtual fire scene
Perceptual: Vision and Depth Perception/Bus Driver	Driving record background check	Seated BOOM or vehicle-based system: Drive bus in a variety of traffic conditions
Other Characteristics		
Conscientiousness and Integrity/Office Administration	Paper and pencil conscientiousness or overt ability test	HMD and joystick: Perform tasks in a virtual office or play virtual reality game

SOURCE: Aguinis et al. (2001).

Kemp (2003) present evidence suggesting that for some attributes (e.g., situational judgment, biodata, personality), web-based assessment produces *superior* psychometric results (e.g., reliability). For most measures of general mental ability and specific cognitive abilities, the answer is also yes, unless the tests are speed tests rather than power tests (Potosky & Bobko, 2004). Because it requires the test taker to be dexterous with the mouse or keyboard, speed adds a different dimension to the assessment (Mazzeo & Harvey, 1988; Mead & Drasgow, 1993). In addition, because web-based assessment has some built in system time, applicants often worry that they are being penalized on speeded tests for this "load time." Even though the system adds time to the testing period for this load time, and even though applicants are told this, they often forget that this is the case and fret over time "lost" (Potosky & Bobko, 2004). Finally, web-based testing often puts limits on test-taking "style." Many test takers prefer to go back and forth in a written test booklet completing items in different sequences, and the display screen seldom provides the amount of information that a test booklet page might. The screen might have room for one or a few items, whereas a test booklet might display a dozen or more items simultaneously (Potosky & Bobko, 2004).

In addition, the computer can be used to assess attributes that could never have been assessed by paper and pencil tests, such as reaction time and spatial and perceptual abilities (Murphy & Davidshofer, 2005). The following are some examples:

- Schmitt, Gilliland, Landis, and Devine (1993) described a computer-based system for assessing applicants for secretarial positions.
- We saw earlier that Ackerman and Cianciolo (1999, 2002) developed computer-based exercises for air traffic control positions.
- Olson-Buchanan, Drasgow, and colleagues (1998) developed a video-interactive test for assessing conflict resolution skills.
- Baron and Chaudry (1997) developed a computer-based interactive device for assessing customer relations skills.

There are many excellent reviews of the promise of computer-based testing, as well as its potential problems (Drasgow & Olson-Buchanan, 1999; McBride, 1998; Naglieri et al., 2004; Olson-Buchanan, 2001). At this point in development, the elegance and excitement of this medium is tempered by its costs. Well-developed and engaging computer (and particularly video) assessment exercises are extremely expensive, putting them out of the reach of the small to middle-sized organization. Virtual reality testing environments, for example, can easily exceed \$300,000 in cost (Aguinis et al., 2001). For large organizations that screen many applicants (e.g., federal and state agencies, large municipal and state police and fire departments, large manufacturing organizations), such a web-based or computerized testing format can be extremely powerful and cost-effective because, among other advantages, it does not require applicants to actually come to a central location for assessment. This is an exciting area for psychological assessment and substantially more data should be available in the next few years.

Unproctored Internet Testing

One final issue related to Internet testing is proctoring. Many organizations prefer that candidates be able to take tests based on their own schedule and at their convenience. This means that there is no proctor available to ensure that the candidate is really the one providing the answers and that the employer is actually screening the candidate and not the candidate's roommate or relative. For ease of discussion, we will refer to this as UIT (unproctored Internet testing). This is more of an issue for ability testing (e.g., cognitive ability) than for testing constructs such as personality or motivation, since the latter constructs are less likely to have a "right" answer and are more likely to depend on the behavioral tendencies of the test taker. There is mixed reaction to the challenges presented by UIT (Tippins, et al., 2006). One position is that assessment for high-level jobs (high stakes assessment) simply cannot be conducted using UIT, but that screening for low-level jobs (low stakes assessment) may be not as vulnerable to cheating. It has been further suggested that one way to deal with the potential for cheating is to require follow-up proctored testing for those candidates who look particularly promising after UIT. It is fairly clear that a candidate who scores poorly even when the possibility of cheating is present is not an attractive candidate. Another issue has to do with the simple of ethics of UIT. A clear case can be made that UIT directly contradicts the ethical principles of both the APA and SIOP with regard to ethical assessment practices, regardless of whether the assessment is high stakes or low stakes. One thing that is in little dispute is the fact that UIT will increase in popularity as employers seek to reduce costs and applicant assessment time. These preliminary discussions of UIT (Tippins et al., 2006) have yielded the following conclusions:

1. Cognitive tests are less suitable for UIT than non-cognitive tests.
2. UIT alone is inappropriate for high stakes assessment.
3. If UIT is used in high stakes assessment, follow-up proctored testing is required.
4. It is not clear if unproctored tests demonstrate the same validity as proctored versions of the same tests.

5. Some cheating is likely in high stakes assessment, but neither the extent nor the effects of that cheating is known.
6. One can never know the identity of the actual test taker in UIT.
7. UIT may be limited by an applicant's access to and comfort with a computer.
8. UIT may provide greater exposure to test items, compromising their security.

UIT, particularly for cognitive abilities and high stakes assessment, seems inappropriate to us. There is no doubt that UIT will increase simply because of its "efficiency," but that is not a reason to abandon good and ethical testing practice. The bottom line is that the score obtained from UIT is best considered a question mark. In addition to being a likely unethical practice, it may also be a psychometrically useless practice.

Who Is a Candidate?

Until recently, there was some confusion and concern among employers regarding who was and was not an official "candidate" when Internet recruiting and job posting systems were used. The problem was that, depending on the definition, the employer might be charged with unfair discrimination based on the proportion of majority and minority applicants who were hired when recruited using Internet-based search engines to advertise openings. The Office of Federal Contract Compliance (OFCCP) clarified that issue in 2005. In order for an individual to be considered an applicant, four conditions must be met:

1. The individual submits an expression of interest in employment through Internet or related electronic data technologies.
2. The employer considers the individual for employment in a particular position.
3. The individual's expression of interest indicates that the individual possesses the basic objective qualifications for the position.
4. The individual at no point in the employer's selection process (prior to receiving an offer of employment from the employer) removes himself or herself from further consideration or otherwise indicates that he or she is no longer interested in the position (Business and Legal Reports, 2005b).

SIOP (Reynolds, 2004) considered these issues in some detail and generally approved the OFCCP's proposed definition. At this point, it is not clear that the OFCCP definition will be universally accepted by various federal agencies. EEOC has a competing, and less precise, definition in draft stage and it is not clear at this point whether the agencies will agree on a common definition. If they do not, employers are likely to be confused.

Computer Adaptive Testing

An interesting innovation in computer testing is a "tailored" procedure known as **computer adaptive testing (CAT)** (Anastasi, 1982; Murphy & Davidshofer, 2005). In this procedure, a candidate does not need to answer every item on a test for adequate assessment. By presenting a candidate with a few items (e.g., ten) that cover the range of difficulty of the test, it is possible to identify a candidate's approximate level of ability and then ask only questions that will further refine the applicant's position within that category. The preliminary test, which every candidate takes, is called a **routing test**. The subsequent tests are the actual measurement tests (see Figure 3.13).

The potential advantages of CAT are obvious. Naglieri, Drasgow, and colleagues (2004) describe CAT systems for the assessment of musical aptitude, dermatology expertise, and conflict resolution skill. In addition, Drasgow (2004) provides illustrations of CAT for CPAs and architects. Borman and his colleagues (Borman, Houston, Schneider, & Ferstl, 2008;

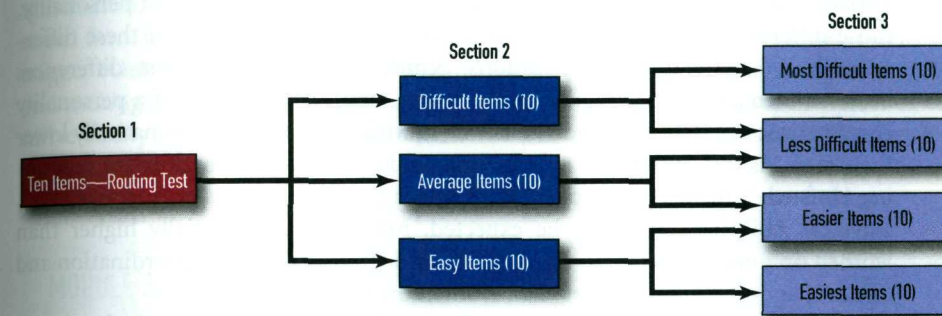


FIGURE 3.13 The Routing Test in Computer Adaptive Testing In computer adaptive testing, test items are arranged in terms of their difficulty. Every candidate takes the same routing test, then one test from Section 2 and one from Section 3, based on his or her performance on the earlier section test.

SOURCE: Murphy & Davidshofer (2005). © 2005. Reproduced by permission of Pearson Education, Inc., Upper Saddle River, New Jersey.

Houston, Schneider et al., 2003) have recently described the development of a CAT of personality for predicting performance in U.S. Navy jobs. In addition to the power of stimulus presentation and manipulation, CAT can be done more quickly because each candidate takes fewer items than would appear on a paper and pencil test. There are some additional, less obvious, advantages (Anastasi, 1982). This type of test produces scores with equal or higher validity and reliability than conventional tests. In addition, CAT provides much finer discrimination among applicants at the high and low ends of the ability scale. The American Council on Education has published an informative set of guidelines related to the use of CAT in educational settings (Green et al., 1995), but these guidelines are also useful for industrial application. Because of the technical and empirical challenges of CAT, it is still out of the reach of most employers, but the armed services are currently using and refining such systems for recruit screening on the ASVAB (Murphy & Davidshofer, 2005). A CAT-based examination you may take if you consider pursuing a graduate career in I-O psychology is the Graduate Record Examination (GRE). The CAT promise is that reliable and accurate assessment can be accomplished more quickly through the power of the computer to narrow the range of the tested attribute quickly. In theory, it should not matter if that attribute is knowledge, a personality dimension, or cognitive ability. We expect that there will be substantial advances in the application of CAT technology to assessment in the next five to ten years.

Testing and Demographic Differences

As indicated earlier in the chapter, the debate about the fairness of all types of assessment has raged for decades and is not likely to disappear in your lifetime. We will deal with the issues of justice and fairness from the psychological perspective in great detail in Chapter 11, and from the legal perspective in Chapter 6. Here, we will take a more descriptive approach and simply report statistics available regarding the extent to which majority and minority subgroups score differently, on the average, on various assessment devices and procedures. These data are excerpted from an excellent statistical and narrative review of these issues presented by Hough, Oswald, and Ployhart (2001).

- **General Mental Ability ("g"):** In comparisons of subgroups on "g," the following hierarchy seems to hold. Highest scores are obtained by East Asians, followed by whites, Hispanics, and finally African Americans. Older working adults score more poorly than their younger counterparts. There are no differences between men and

Computer adaptive testing (CAT) Presents a test taker with a few items that cover the range of difficulty of the test, identifies a test taker's approximate level of ability, and then asks only questions to further refine the test taker's position within that ability level.

Routing test Preliminary test used in computer adaptive testing that identifies a test taker's approximate level of ability before providing additional questions to refine the test taker's position within that ability level.

women. Differences in reasoning ability follow the same pattern but are less pronounced as differences in “g.”

- **Personality:** While whites and blacks score differently on measures of personality, those differences are minimal compared to “g,” and it is not clear if these differences have any practical implications. Similarly, there are modest differences between men and women, and old and young, with the exception of a personality characteristic called “rugged individualism” in which women score dramatically lower than men. As this dimension reflects “masculinity” as we defined it when describing Hofstede’s theory in Chapter 1, this finding should come as no surprise.
- **Physical Abilities:** As would be expected, men score substantially higher than women on muscular strength and stamina, moderately higher on coordination and balance, and moderately lower than women on tests of flexibility.
- **Mode of Presentation (Paper and Pencil versus Video):** Whites obtain higher scores on paper and pencil tests than either African Americans or Hispanics; the difference is less pronounced on video tests. Women obtain higher scores than men on both paper and pencil and video-based tests.
- **Interviews and Biodata:** DeCorte and Lievens (2003) summarize earlier meta-analyses and estimate that compared to cognitive ability tests, majority–minority differences in structured interview scores and biodata scores are considerably less pronounced, although minority test takers do more poorly than their majority counterparts.
- To this summary, we need to add the recent meta-analytic findings of Dean, Roth, and Bobko (2008) showing that Hispanic and black assessment center candidates receive generally lower scores, while female candidates receive generally higher scores than their male counterparts. Unfortunately, assessment center researchers have rarely included age in their analyses, so too few studies were available for Dean and colleagues to examine the relationship between age and assessment center ratings.

As you can see from this summary, minority and older test takers seem to be at a constant disadvantage in standardized assessment situations, more so in some forms of assessment than others. The exact magnitude of these differences is the subject of some debate (Bobko, Roth, & Buster, 2005; Roth, BeVier, Bobko, Switzer, & Tyler, 2001; Roth, Van Iddekinge, Huffcutt, Eidson, & Bobko, 2002), but the conclusion that the differences have practical importance and largely favor majority test takers is not.

By far the greatest differences between majority and minority test takers appear on paper and pencil tests of cognitive ability. What do I-O psychologists think about that? Murphy, Cronin, and Tam (2003) presented the results of responses of 700 I-O psychologists to questions related to this issue. This is what they found:

1. I-O psychologists generally accept cognitive ability tests as valid and fair.
2. They accept cognitive ability tests as good but incomplete estimates of intelligence.
3. They believe that a test of cognitive ability is not sufficient by itself to make accurate predictions of future job success.
4. They believe that different abilities will be more or less important for predicting success on various aspects of work behavior.
5. They believe that diversity in a workforce is good and that adverse impact should be avoided.
6. There is considerable disagreement among I-O psychologists regarding whether “g” is the *most* important human attribute in the work setting.

The data presented above highlight a dilemma: Our “g-ocentric” traditions appear to limit opportunities for minority applicants, but we value diversity and dislike adverse impact.

The way off the horns of that dilemma seems to be the continued exploration of assessment practices that combine tests of cognitive ability (in both paper and pencil and more nontraditional forms) with tests of noncognitive attributes. As an example of a nontraditional format, consider some recent research by I-O psychologist Jim Outtz and his colleagues (Outtz, 2002, in press). In addition, there are methods of combining information and making actual hiring decisions that can also be used to ameliorate the effect of cognitive ability tests on minority test takers. We will cover those methods in Chapter 6 on staffing decisions.

MODULE 3.5 SUMMARY

- An important issue in assessment is not *which* tool to use, but what *combination* of tools to use for the greatest predictive ability at the lowest cost. I-O psychologists have examined the predictive validity of particular combinations to demonstrate the added value of combining two or more assessment devices.
- Virtually every commercial test available in paper form is also available on the computer. The

variety of tests that can be presented on a computer platform is almost without limits. At this point, however the elegance and excitement of the computer-based medium is tempered by its costs: Well-developed and engaging computer (and particularly video) assessment exercises are extremely expensive.

KEY TERMS

incremental validity biodata	ecology model social desirability	computer adaptive testing (CAT) routing test
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4

Job Analysis and Performance

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MODULE 4.1

A Basic Model of Performance

I-O psychologists have devoted a great deal of their research and practice to understanding and improving the performance of workers. All of us who have participated in a work group (or a classroom learning experience) have observed differences in the performance of group members. Some perform at a very high level, whereas others perform a good deal lower. Research has shown that the ratio of the productivity of the highest performer to the lowest performer in jobs of low difficulty ranges from 2:1 to 4:1, while in jobs of high difficulty, this ratio can be as much as 10:1 (Campbell, Gasser, & Oswald, 1996). Performance can also vary considerably depending on whether the employee is asked to provide maximum or typical performance. We are all capable of higher levels when the situation demands it. Such differences represent a striking degree of variation, variation that is crucial to an employer struggling to survive in a competitive environment. Imagine having an employee who handles an average of five customer complaints a day, compared to one who resolves 15. Or a sales representative who closes on five contracts a month versus one who brings in 50. Research (Doerr, Mitchell, Freed, Schriesheim, & Zhou, 2004) has confirmed that there are differences in performance not only *between* individuals, but also *within* individuals across time. From this it is clear why I-O psychologists and employers are vitally interested in employee performance. But what do we mean when we say “performance”?

In Chapter 3, we described some common psychological variables. We have seen personality decomposed into various factors (e.g., Digman, 1990; Hough, 1992; Morgeson et al., 2007a, 2007b; Tett & Christiansen, 2007), and intelligence parsed into levels or layers of cognitive abilities (e.g., Carroll, 1993). We have examined evidence that these factors help us predict worker success or job performance. But when it comes to performance, we have not yet focused on the question of the *type* of performance being predicted.

Campbell's Model of Job Performance

Remember that psychology deals with behavior. In the case of work psychology, that means the behavior of workers, or worker performance. Consider the following variables that I-O psychologists have used as measures of performance (Campbell, McCloy, Oppler, & Sager, 1993):

- Time to complete a training course.
- Number of pieces produced.
- Total days absent.
- Total value of sales.
- Promotion rate within an organization.

An important question that is often overlooked is: To what extent can an individual worker control any of these measures of performance? Research has demonstrated that the actual task design and work flow process can substantially affect an individual worker's potential output (Doerr et al., 2004; Tett & Burnett, 2003). Let's examine each of the above performance measures with a more critical view.

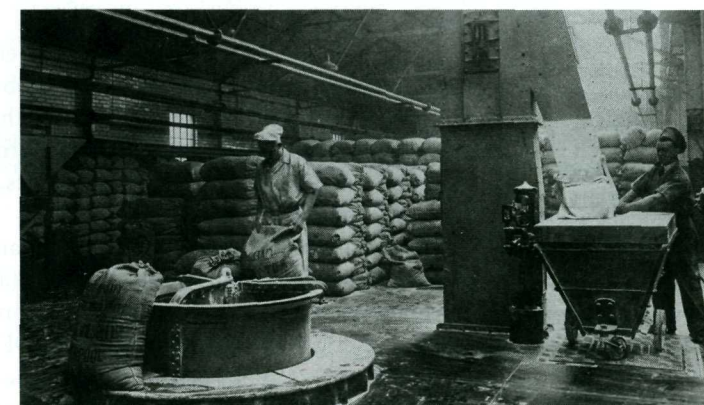
- Time to complete a training course might be constrained by how much time the worker can be away from the workplace.
- Number of pieces produced is affected by the technology and equipment used by that worker.
- Total days absent does not distinguish between excused and unexcused, sick days, personal days, or vacation days.
- Total value of sales will be affected by discounts, territory, competition, marketing promotions, or by the value of the products the employee is assigned to sell.
- Promotion rate within an organization will be affected by the turnover rate in that organization.

Thus, we can see that in each of these cases, the “performance” measure was not really (or at least not exclusively) an individual behavior.

A number of I-O psychologists (Campbell, 1990a, b, 1999; Campbell et al., 1993, 1996; McCloy, Campbell, & Cudek, 1994) have argued persuasively that I-O psychology has spent a great deal of time describing the various worker attributes that “cause” or are related to performance, but little time describing actual performance at the individual worker level. Your authors agree. Campbell and his colleagues have proposed a model of work performance that provides a more detailed view of performance, and one that helps to separate the factors that are directly under the worker's control from those that aren't. Before presenting his model, we need to set forth some definitions (Campbell et al., 1993).

Performance is behavior. In its ideal form, it is something that people actually do and that can be observed. In many jobs, of course, the “behavior” is thinking, planning, or problem solving and cannot be actually observed; instead, it can only be described with the help of the individual worker. In the work setting, performance includes only those actions or behaviors that are relevant to the organization's goals and can be measured in terms of each individual's proficiency. Performance is what the organization hires an employee to do and to do well. Performance is *not* the consequence or result of action; it is the action itself.

Effectiveness is the evaluation of the results of performance. The variation in a measure of effectiveness is often controlled by factors beyond the actions of an individual, as is evident from the example of total value of sales.



As this 1920s photo indicates, work has changed considerably since the introduction of the factory system.

Performance Actions or behaviors relevant to the organization's goals; measured in terms of each individual's proficiency.

Effectiveness Evaluation of the results of performance; often controlled by factors beyond the actions of an individual.

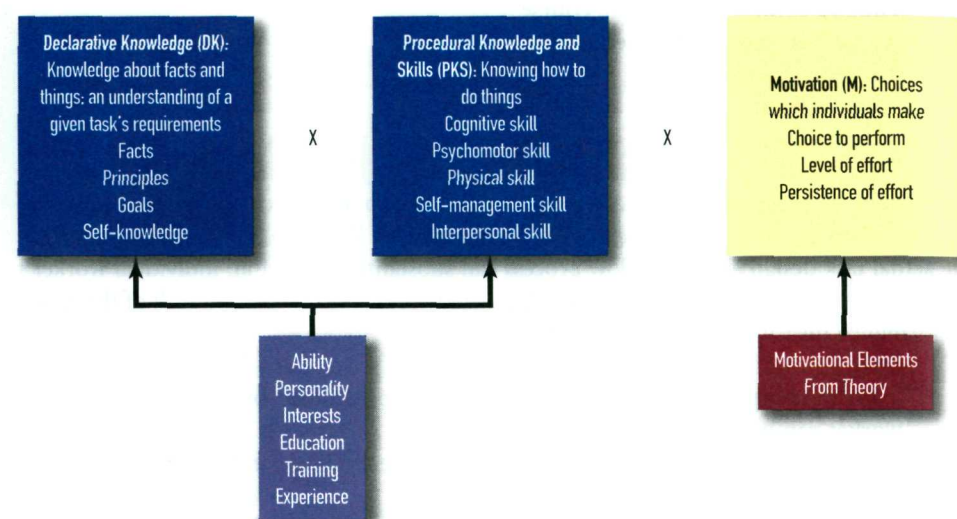


FIGURE 4.1 Campbell's Determinants of Job Performance

SOURCE: Based on Campbell et al. (1993).

Productivity Ratio of effectiveness (output) to the cost of achieving that level of effectiveness (input).

Declarative knowledge (DK) Understanding what is required to perform a task; knowing information about a job or job task.

Procedural knowledge and skill (PKS) Knowing how to perform a job or task; often developed through practice and experience.

Motivation (M) Concerns the conditions responsible for variations in intensity, persistence, quality, and direction of ongoing behavior.

Determinants of performance Basic building blocks or causes of performance, which are declarative knowledge, procedural knowledge, and motivation.

Performance components May appear in different jobs and result from the determinants of performance. John Campbell and colleagues identified eight performance components, some or all of which can be found in every job.

Productivity is the ratio of effectiveness (output) to the cost of achieving that level of effectiveness (input) (Mahoney, 1988). A profit margin for a unit or company is an index of productivity. For in-depth discussions of the relationship between performance and productivity, see Campbell and Campbell (1988) and Pritchard (1992; Pritchard, Harrell, DiazGranados, & Guzman, 2008).

Based on extensive research with army enlisted personnel, Campbell developed a hierarchical model of job performance (Campbell, 1990a; Campbell, McHenry, & Wise, 1990; Campbell & Zook, 1990). He postulated three and only three direct determinants of job performance: **declarative knowledge (DK)**, **procedural knowledge and skill (PKS)**, and **motivation (M)** (see Figure 4.1). By determinants, he means the basic building blocks or causes of performance.

Campbell's model also proposes that many of the variables we have examined in earlier chapters and will examine in later chapters (ability, personality, interest, training and experience, motivators) have an *indirect* effect on performance. These variables can affect performance only by changing the level of DK, PKS, or M. For example, increased training or experience will affect performance by increasing DK or PKS; incentives for performance will affect performance by increasing M (inducing the person to perform at a higher level, or to perform for a longer period of time). Similarly, Tett and Burnett (2003) propose that personality, and in particular conscientiousness, has a substantial effect on goal setting, which in turn increases declarative knowledge. They suggest that this connection explains the finding (noted in Chapter 3) that conscientiousness has strong and positive correlations with job performance (Barrick & Mount, 1991, 2005; Barrick, Mount, & Strauss, 1993).

There is one other important aspect to Campbell's model: actual performance components. DK, PKS, and M are **determinants of performance**, but they are not behaviors (i.e., they are not performance itself). Campbell's research identified at least eight basic performance components (Table 4.1), some or all of which can be found in every job. When we combine the eight performance components with the three direct determinants of performance and the various indirect determinants of performance, we get an expanded model such as the one depicted in Figure 4.2. Although the model specifies eight distinct **performance components**, not all components will appear in all jobs. Nevertheless, the model allows performance in any job to be parsed into all or some subsets of these components. Campbell asserted that three of the performance components—core task proficiency, demonstrating effort, and maintaining personal discipline—are essential at some level for every job.

TABLE 4.1 Campbell's Eight Performance Components

Performance components and definitions

Job-specific task proficiency: An individual's capacity to perform the core substantive or technical tasks central to the job.

Non-job-specific task proficiency: An individual's capacity to perform tasks or execute performance behaviors that are not specific to their particular jobs.

Written and oral communication task proficiency: An individual's proficiency in writing and speaking, independent of the correctness of the subject matter.

Demonstrating effort: The consistency of an individual's effort; the frequency with which people will expend extra effort when required; the willingness to keep working under adverse conditions.

Maintaining personal discipline: The extent to which an individual avoids negative behavior such as excessive absenteeism, alcohol or substance abuse, and law or rules infractions.

Facilitating peer and team performance: The extent to which an individual supports peers, helps peers with problems, helps to keep a work group goal directed, and acts as a role model for peers and the work group.

Supervision/leadership: Proficiency at influencing the performance of subordinates through face-to-face interpersonal interaction and influence.

Management/administration: Behavior directed at articulating for the unit, organizing people and resources, monitoring progress, helping to solve problems that might prevent goal accomplishment, controlling expenses, obtaining additional resources, and dealing with other units.

SOURCE: Based on Campbell et al. (1993).

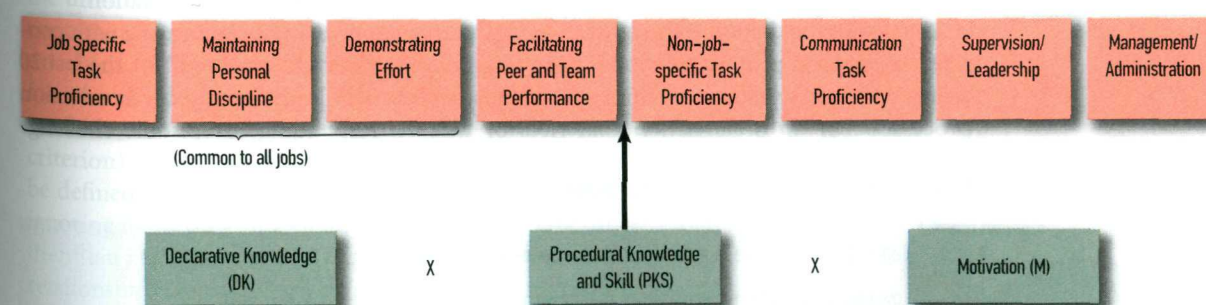


FIGURE 4.2 The Full Campbell Model

SOURCE: Based on Campbell et al. (1993).

Campbell's expanded model has a great deal of intuitive appeal as well as research support (McCloy et al., 1994). It occupies a valuable middle ground between a view of performance as some unitary entity or a single broad factor—a view that contradicts what we can observe at work every day—and an equally ineffectual view that says every job is different and there can be no general understanding of job performance beyond the particular job being considered. It also helps us as I-O psychologists to keep our psychological

“eye on the ball”: to concentrate our attention on aspects of work behavior that are under the direct control of the worker.

Typical versus Maximum Performance

There has been some discussion of “typical” versus “maximum” performance (DuBois, Sackett, Zedeck, & Fogli, 1993; Sackett, Zedeck, & Fogli, 1988; Sackett, 2007). Typical performance might be characterized by a worker putting in 70 percent effort for eight hours; maximum performance, in contrast, might be that same worker putting in 100 percent effort for four (or even eight!) hours. The implication is that these are somehow different types of performance. Maximum performance can be thought of as the very best a person can do—exerting 100 percent effort, leaving nothing in reserve. Typical performance is everything else. The question is whether the predictors of typical performance

are also the predictors of maximum performance. Further, it is not clear how long a worker can demonstrate maximum performance. Consider the pressures on postal and courier drivers in the days leading up to Christmas—or the deadly urgency with which wildland firefighters work, putting in several consecutive 20-hour days struggling to get a fire under control. When first introduced by Sackett and colleagues (1988), maximum performance was thought to be controlled largely by abilities (e.g., intelligence) and typical performance by a combination of ability and motivation. In 2007, Volume 20 (no. 3) of the journal *Human Performance* was devoted to a consideration of maximum versus typical performance. That treatment is summarized in Table 4.2 and, as you can see, it provides support for the Sackett interpretation.

The distinction between these two forms of performance is an intriguing one with considerable applied promise, yet it has been largely in the research “shadows” for the last 20 years. We expect that renewed interest in this concept will lead to advances in selection processes. For an organization that rises or falls on responding to episodic challenge

TABLE 4.2 Maximum versus Typical Performance

1.	Goal setting is effective in inducing maximum performance (Mesmer-Magnus & Viswesvaran, 2007).
2.	Low confidence undermines maximum performance (Klehe, Anderson, & Hoefnagels, 2007).
3.	When performance is complex (many competing demands), the most important (i.e., emphasized by the organization) areas usually display aspects of maximum performance while less important areas usually display aspects of typical performance (Mangos, Steele-Johnson, LaHuis, & White, 2007).
4.	The variability between typical and maximum levels of performance within a single individual is an important aspect of performance from the organizational perspective (Barnes & Morgeson, 2007).
5.	Maximum performance is influenced by cognitive ability and formal knowledge (declarative knowledge in the Campbell model), whereas typical performance is influenced by personality (Klehe & Anderson, 2007a, b; Marcus, Goffin, Johnston, & Rothstein, 2007; Witt & Spitzmüller, 2007).

SOURCE: Summarized from *Human Performance* (2007), Volume 20 (no. 3).



Fighting wildland fires can require maximum performance for hours or even days at a stretch.

(e.g., product failure, competitive environment, seasonal demands), maximum performance predictors will be relatively more important than typical performance predictors. Further, for the organization that experiences variations in demands from chaos to calm, it might be wise to look for employees who show the smallest variation between typical and maximum performance (preferably biased toward the maximum end!).

Criterion Deficiency and Contamination

Campbell’s approach to defining job performance introduces two concepts that are well established in I-O psychology: **criterion deficiency** and **criterion contamination**. Let’s start with a simple nonpsychological example. Consider the dietary supplement omega-3, an essential fatty acid found in fish oil that has been linked with positive health outcomes such as a reduction in cardiac disease and improved emotional well-being. Let’s suppose that a new manufacturer of omega-3 claims that its supplement is “pure” omega-3. To most of us that would mean that it is 100 percent omega-3. Now let’s give it to a chemist and see whether it meets the purity claim. The results tell us that it is not 100 percent omega-3, but is only 80 percent fish oil; the remaining 20 percent is a stimulant such as ephedrine. This supplement would be both deficient (it did not contain as much omega-3 as it claimed) and contaminated (it contained 20 percent ephedrine). If we really just wanted omega-3, we would be well advised to purchase a different brand that was 100 percent omega-3 (neither deficient nor contaminated).

As you will recognize from our treatment of validity in Chapter 2, in the validity context, performance would be referred to as a criterion. In an ideal world, we would be able to measure all relevant aspects of job performance perfectly. A collective measure of all of these aspects would be called the **ultimate criterion**, but since we can never reliably measure all aspects of performance, we settle for an **actual criterion**. A classic validity study might test cognitive ability (the predictor) by correlating it with a measure of job performance (the actual criterion, e.g., supervisory ratings of performance) to see if higher scores on the test are associated with higher levels of rated performance. The differences between the ultimate criterion and the actual criterion represent imperfections in measurement—contamination and deficiency. A contaminated actual criterion includes information unrelated to the behavior we are trying to measure. For example, if a production figure for an individual worker is affected by the technology or the condition of the particular machine that worker is using, then we would consider that production figure (i.e., criterion) contaminated. Similarly, if we consider the performance of a police officer to be defined exclusively by the number of criminals apprehended, ignoring many other important aspects of the police officer’s job, then that statistic would be considered a deficient criterion. The relationships among criterion deficiency, criterion contamination, and criterion relevance are graphically presented in Figure 4.3.

Campbell’s model of performance, by focusing on worker behaviors and the extent to which the worker has complete control over outcomes, protects against criterion contamination. Similarly, by providing eight of the most important and unique aspects of performance in most jobs, it also protects against criterion deficiency. It is important to keep in mind that probably not a single job has only *one* behavior that defines successful performance. Just as the predictor side of the basic work prediction equation is complex—requiring a consideration of many different combinations of human attributes such as intelligence,

Criterion deficiency Occurs when an actual criterion is missing information that is part of the behavior one is trying to measure.

Criterion contamination Occurs when an actual criterion includes information unrelated to the behavior one is trying to measure.

Ultimate criterion Ideal measure of all of the relevant aspects of job performance.

Actual criterion Actual measure of job performance obtained.

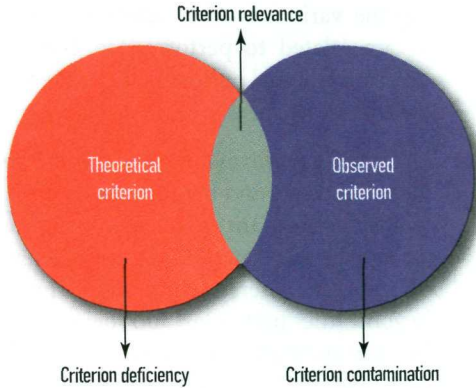


FIGURE 4.3 Criterion Contamination, Deficiency, and Relevance

personality, and motivation—so is the criterion side, requiring a consideration of many different aspects of performance. Workers call on many attributes to perform their jobs, and each of these human attributes (predictors) is associated with certain aspects of performance.

A Broader View

By now you may have noticed an implied connection between individual worker performance and organizational success. We will look at this connection more closely in Chapter 6; for the moment, let's consider it in light of how we define success. Campbell defines performance as what the organization pays a worker to do. But worker performance is not the same thing as organizational success, even though an organization is unlikely to be successful if the workers fail to do what they are paid to do.

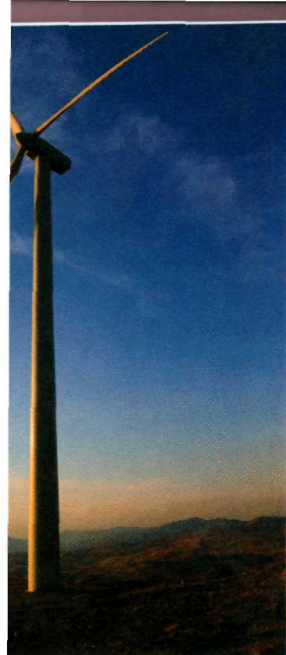
Jan Cleveland has done a great deal of research and thinking about the relationship between work and success and suggests that our view of “success” may be too limiting. She argues that the “criterion” we most often choose to index success is deficient (Cleveland, 2005). Cleveland proposes that any responsible definition of organizational success must also include some aspect of work–family balance—a topic we will examine in detail in Chapter 10. A workaholic may very well contribute to the short-term success of the organization while at the same time dismantling his or her family life, with the consequent damage to worker, spouse, and child well-being. As an example, Cleveland argues that “if ‘face time’ is an important element of what is perceived to be successful, employees are likely to spend more time at work and less time with their families.” This is an important and timely observation, since many organizations are reversing their embrace of “virtual” and “distance” work and re-emphasizing work in a central and physical location (i.e., face time). Cleveland continues, “Organizations that succeed today by burning out their employees may ‘poison the well’ in the sense that they make it difficult for future employers to succeed.” She concludes that by not including some aspect of work–family balance in the definition of organizational success (i.e., the “ultimate criterion”), everyone—the organization, the worker, the family, and even society as a whole—ultimately loses.

KEY TERMS

performance effectiveness	procedural knowledge and skills (PKS)	criterion deficiency
productivity	motivation (M)	criterion contamination
declarative knowledge (DK)	determinants of performance	ultimate criterion
	performance components	actual criterion

MODULE 4.1 SUMMARY

- I-O psychologists have devoted a great deal of their research and practice to understanding and improving the performance of workers. They have also spent a great deal of time describing the various worker attributes that “cause” or are related to performance, but little time describing actual performance at the level of the individual worker.
- Campbell’s performance model occupies a valuable middle ground between an overly simplistic view of performance as a single broad factor and an equally idiosyncratic view that there can be no general understanding of job performance beyond the particular job being considered, because every job is different. Campbell’s model also helps I-O psychologists to concentrate on aspects of work behavior that are under the direct control of the worker.
- In nearly all jobs, performance is multidimensional; that is, just as the predictor side of the basic work prediction equation requires a consideration of many different combinations of human attributes, the criterion side requires a consideration of many different aspects of performance. Workers call on many attributes to perform their jobs, and each of these human attributes is associated with unique aspects of performance. Recent research suggests that there is an important difference between worker performance and organizational success, and that work–life–family balance may be a significant factor in defining success.



MODULE 4.2

Extensions of the Basic Performance Model

Task Performance versus Organizational Citizenship Behavior

When performance is discussed, it is usually in the context of one or more tasks that define a job. These tasks can be found in job descriptions, work orders, and so forth. But there is more to work life than just assigned tasks. You have probably observed that, when it comes to job performance, there are two kinds of workers. The first do exactly what they are assigned, and no more. They avoid putting themselves out for co-workers or expending any extra effort on behalf of the organization. The second type of worker is the exact opposite. These workers go out of their way to make life easier for their co-workers and supervisor, with the result that they are often described as “exceeding expectations.” The term “expectations” is the key. It is not that the first type of employee is doing anything wrong. Why should you do anything beyond the expectations set forth in your job description? But we can observe that some people do exceed expectations.

A number of years ago, Organ and his colleagues (Smith, Organ, & Near, 1983) labeled this type of behavior—going beyond what is expected—**organizational citizenship behavior (OCB)**, and developed questionnaires to assess that behavior in workers. The questionnaires seem to assess two separate aspects of OCB, **altruism**—helpful behaviors directed toward individuals or groups within the organization, such as offering to help a co-worker who is up against a deadline—and **generalized compliance**—behavior that is helpful to the broader organization, such as upholding company rules (Organ & Ryan, 1995).

It appears that OCB is closely associated with the fact that work is a joint rather than an individual effort. As an example, Bachrach, Powell, Bendoly, and Richey (2006) found that OCB was considered more important when work tasks required collaboration among workers or within work teams. It does seem that OCB is largely a social phenomenon. Borman and Motowidlo (1993) continued this line of research, investigating extra-role behavior (i.e., things that go beyond the job description), which they contrasted with **task performance**. The generally accepted term for research in this area is OCB (Borman, 2004b). Task performance is defined as “the proficiency with which job incumbents perform activities that are formally recognized as a part of their job” (p. 73). OCB, in contrast, is more informal and is defined as “behaviors that go beyond task performance and technical

Organizational citizenship behavior (OCB) Behavior that goes beyond what is expected.

Altruism Helpful behaviors directed toward individuals or groups within the organization, such as offering to help a co-worker who is up against a deadline.

Generalized compliance Behavior that is helpful to the broader organization, such as upholding company rules.

Task performance Proficiency with which job incumbents perform activities that are formally recognized as a part of their job.

TABLE 4.3 A Three-Category Taxonomy of Organizational Citizenship Behavior

Personal Support

Helping others by offering suggestions, teaching them useful knowledge or skills, directly performing some of their tasks to help out, and providing emotional support for their personal problems.

Cooperating with others by accepting suggestions, informing them of events they should know about, and putting team objectives ahead of personal interests.

Showing consideration, courtesy, and tact in relations with others, as well as motivating and showing confidence in them.

Organizational Support

Representing the organization favorably by defending and promoting it, as well as expressing satisfaction and showing loyalty by staying with the organization despite temporary hardships.

Supporting the organization’s mission and objectives, complying with reasonable organizational rules and procedures, and suggesting improvements.

Conscientious Initiative

Persisting with extra effort despite difficult conditions.

Taking the initiative to do all that is necessary to accomplish objectives even if not normally a part of own duties, and finding additional productive work to perform when own duties are completed.

Developing own knowledge and skills by taking advantage of opportunities within the organization and outside the organization, using own time and resources, when necessary.

SOURCE: Borman (2004b).

proficiency, instead supporting the organizational, social, and psychological context that serves as the critical catalyst for tasks to be accomplished” (Borman, 2004b, p. 238). Table 4.3 illustrates one approach to distinguishing organizational citizenship behavior from other areas of job performance.

In Chapter 3, we saw the emergence of measures of personality and emotional intelligence as the new “favorite” predictor variables to study. OCB, similarly, is the new “favorite” measure of performance to be studied by I-O psychologists. Between 1980 and 1989, the topic appeared in only ten journal articles. Between 1990 and 1999 this number had grown to 181. And in the eight years between 2000 and 2008, the number was 262! This is an astounding growth rate, and it shows no signs of stopping. Borman (2004b) suggests that the increase may be the result of current trends “such as increased global competition, greater use of teams, continuing downsizing initiatives, and more emphasis on customer service” (p. 238). A more instrumental logic is proposed by Salamon and Deutsch (2006); they suggest that employees use OCB to get noticed by managers and signal their “un-observable capabilities.” Luthans (2002) suggests another possible reason for the interest in OCB. He proposes that we may be seeing a trend toward emphasizing the more positive aspects of the work experience rather than the more neutral (task performance) or negative (counterproductive work performance) ones. “Positive psychology” is making inroads in virtually all areas of applied psychology (Seligman & Csikszentmihalyi, 2000), so it is encouraging to see it reflected in the work of I-O psychologists. This interest parallels our earlier discussion of “good work” in Chapter 1.

In the earlier periods of research on OCB, Peterson and colleagues (1990) demonstrated that while measures of cognitive ability are most closely associated with task performance, measures of personality do a better job of predicting OCB. Motowidlo, Borman, and Schmit (1997) provided a theoretical explanation of the personal attributes that appear to

contribute to OCB and task performance. They proposed that technical task performance is determined by cognitive ability, predominantly through the effect of cognitive ability on knowledge, skills, and habits. Cognitive ability becomes particularly important in technically complex tasks and tasks requiring problem solving and reasoning. In contrast, OCB is best predicted by personality dimensions, particularly conscientiousness, because individuals high in conscientiousness are much more likely to persist with extra effort in completing their work and following organizational rules and procedures. We alluded to this distinction earlier in the chapter when we introduced the notion of typical versus maximum performance. The researchers also proposed that learning experiences will influence both task performance and OCB. Van Scotter, Motowidlo, and Cross (2000) demonstrated that both OCB and task performance contribute independently to career success, and Motowidlo and van Scotter (1994) found that OCB and task performance contributed independently to ratings of overall performance. This latter point is particularly interesting because it shows that evaluations are influenced not only by what workers are *assigned* to do, but also by what they *volunteer* to do. While all of these findings anticipated later findings, they gave little recognition to the role of the environment on the emergence of OCB. As we will see below, current research on OCB is including environmental variables such as task design and organizational climate. This is a good example of the increasing importance of meso-research, which we described in Chapter 2.

Although researchers agree on the value of the concept or construct of OCB, they differ as to how it will be defined and measured. As interest in OCB has increased, so has research into exactly what it means. Recent reviews and theoretical articles have raised questions about the adequacy of current measures of OCB (LePine, Erez, & Johnson, 2002; Podsakoff, MacKenzie, Paine, & Bachrach, 2000; Vey & Campbell, 2004). A recent meta-analysis (Hoffman, Blair, Meriac, & Woehr, 2007) suggests that OCB is a unitary factor and that various facets or dimensions (e.g., perseverance, altruism) can actually be added together to get a single OCB score.

As is the case with many variables of interest to I-O psychology, early research has centered on the meaning and application of the concept in U.S. settings. Nevertheless, the increasing globalization of work has led to research in many different cultures to see if OCB might be a universal aspect of work performance, one that cuts across cultures. So far, research has been reported with Mexican (Tierney, Bauer, & Potter, 2002), Nigerian (Ehigie & Otukoya, 2005), Chinese (Hui, Lee, & Rousseau, 2004), Australian (Feather & Rauter, 2004), and Dutch/Belgian (Lievens & Anseel, 2004) samples. Recently Joireman, Kamdar, Daniels, and Duell (2006) found that OCB appeared more frequently among individuals with a longer-term time horizon. Recall from Chapter 1 that many Asian cultures are characterized by a long-term time orientation. Thus, we can hypothesize that OCBs may have a higher value and a higher frequency in these cultures. In contrast, it may be more remarkable to see OCBs in cultures (such as the U.S.) which tend toward a shorter time perspective. In fact, Salamon and Deutsch (2006) propose that in the short term, OCBs are really wasted effort and that workers who engage in them are doing it for distant rewards, such as eventual promotions. Thus, while OCBs may *appear* in many cultures, it is still not clear if they are the norm or the exception.

Causes and Correlates of OCB

As often happens when a new concept or construct emerges, a good deal of research is beginning to appear related to the antecedents and correlates of OCB. Here are some examples:

- Hunt (2002) found that in very structured jobs where employees are expected to follow formal and rigid rules for job performance (e.g., steel workers and barge deckhands), OCB is likely to do as much harm as good. It appears that self-initiated

“initiative” might actually increase the risk of an accident. One can imagine that occupations in other tightly controlled work environments such as petrochemical operations and nuclear power will reveal similar results.

- Gellatly and Irving (2001) found that jobs high in autonomy were more likely to be associated with the appearance of OCB. Further, they discovered that when autonomy was low, conscientious workers were less likely to display OCB. Data presented by Beaty, Cleveland, and Murphy (2001) further support the notion that the work environment can constrain the appearance of OCB.
- Witt, Kacmar, Carlson, and Zivnuska (2002) studied the relationship between negative organizational “politics” (e.g., a tendency to agree with superiors for the sake of going along, the role of unpopular but good ideas) and OCB. They discovered that the more negative the political environment, the less likely it was the OCB would appear. They also found that individuals high on the agreeableness dimension of the Big 5 were likely to display OCB in positive and negative environments.
- Borman, Penner, Allen, and Motowidlo (2001) found evidence for a positive relationship between conscientiousness and OCB.
- Both Heilman and Chen (2005) and Kidder and Parks (2001) suggest that men engaging in OCB are viewed positively, while women displaying the same behavior are seen as simply doing their jobs.

This sample of studies illustrates the wide variety of research that is likely to emerge regarding OCB: personality, job design, organizational culture and climate, and even gender stereotyping. This research, currently in its infancy, shows promise as a fascinating view of the emerging definition of effective performance and how it can be achieved.

The concept of OCB complements Campbell’s model, which we considered earlier in this chapter (Campbell et al., 1996). Figure 4.4 shows the relationship between the five contextual factors and Campbell’s eight performance components. You will remember from

(Campbell Factors)	(Contextual factors)				
	Persisting	Volunteering	Helping	Following Rules	Supporting
Job-specific task proficiency					
Non-job-specific task proficiency					
Communication task proficiency					
Demonstrating effort	xx	xx			
Maintaining personal discipline				xx	
Facilitating team and peer performance			xx		
Supervision/leadership					xx
Management/administration					xx

FIGURE 4.4 Matrix with Contextual Factors and Campbell’s Performance Components

SOURCE: Based on Campbell et al. (1996).

Chapter 3 that the Big 5 factor of conscientiousness could be broken down further into achievement and dependability (Hough, 1992). Here we see a similar structure: Campbell's "demonstration of effort" component can be seen as having connections to all three of the OCB dimensions. Note that all of the dimensions of OCB meet the standards that Campbell sets for what should be considered "performance"; they are observable actions and they are under the control of the individual. It seems clear from both research and our own experience in jobs that OCB is an important part of success at any job.

There is, of course, an elephant in the performance room. While all would agree that OCB is a positive addition to the workplace, what happens when organizations expect or require it? At the very least, questions of fairness might arise. Employees may believe they are paid to perform tasks A, B, and C, whereas their employer may believe that in addition to performing those tasks, the employees are also expected to display behaviors D (volunteering), E (following the spirit as well as the letter of company rules), and F (speaking positively about the company). There is no research that illuminates this dilemma yet. But you can be sure that when OCB becomes "required," it will lose something. In addition, if OCB is truly driven by personality characteristics, it may be that selection schemes will need to emphasize these noncognitive attributes to a much greater extent in any selection battery.

The Dark Side of Performance: Counterproductive Work Behaviors

Above, we have considered the "sunny side" of performance and productivity: leveraging organizational goals through human attributes that lead to high levels of worker performance. But there is a dark side to the picture as well. There are constraints to this leveraging process, and they can be collected under the heading **counterproductive work behavior (CWB)**. As was the case with OCB, there has been an explosion of research in CWB. From 1940 to 2000, a total of 60 publications dealt with topics related to CWB (e.g., workplace aggression and violence). In the eight years beginning in 2000, that number has grown to 207. However, in a fascinating historical review of personality testing in industry, Gibby and Zickar (2008) document the early (ca. 1920) and increasing interest in worker "maladjustment." Thus it appears that interest in the "problem" employee is hardly new.

Robinson and Bennett (1995) broke counterproductive behavior into two separate aspects: deviance directed toward the organization, and deviance directed toward other individuals. They defined counterproductive behavior as "voluntary behavior that violates significant organizational norms and in so doing, threatens the well-being of the organization, its members, or both" (p. 556). Rather than contributing to the goals of the organization, these actions run directly counter to those goals. Although we deal with counterproductive behavior in detail when we discuss job dissatisfaction in Chapter 9, it is also worthwhile to consider it here so that we can fully understand performance from an organizational perspective. A recent book by Fox and Spector (2005) covers the topic of CWB in great detail for the interested student.

Sackett and colleagues (Sackett, Berry, Weinaman, & Laczko, 2006; Sackett & DeVore, 2001) have carefully parsed counterproductive work behavior. They propose a hierarchical explanation with a broad factor of counterproductive behavior at the top level, two less broad factors of organizational deviance and interpersonal deviance in the middle level, and individual counterproductive behaviors such as theft, absence, sabotage, and substance abuse at the lowest levels (Figure 4.5). Gruys and Sackett (2003) have further broken CWB into as many as 66 distinct behaviors, collected into 11 general categories. Others have

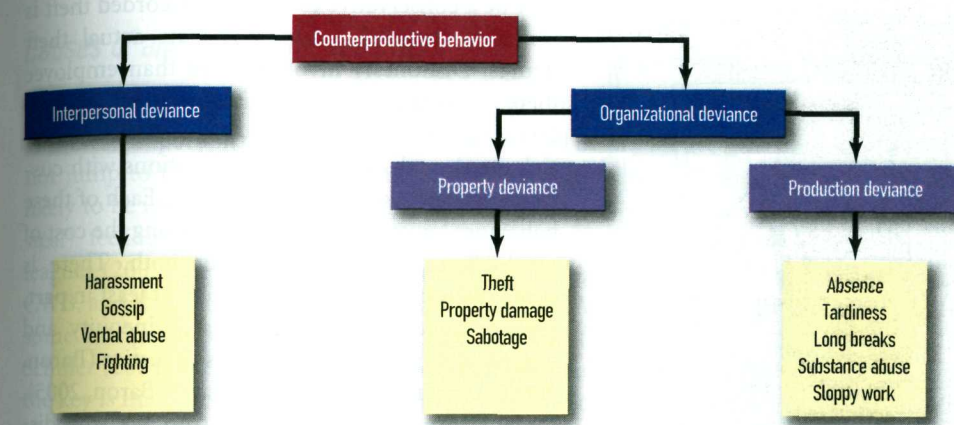


FIGURE 4.5 Sackett and DeVore's Hierarchical Model of Deviance

SOURCE: Based on Sackett & DeVore (2001).

suggested alternative models of CWB. Vardi and Weiner (1996) distinguish among three types:

- S, behavior done for self-gain (e.g., theft);
- O, behavior for organizational gain (e.g., misstating profit or overbilling);
- D, behavior that is destructive (e.g., sabotage, assault).

The "O" type of misbehavior is a step beyond what Sackett and his colleagues propose (Gruys & Sackett, 2003; Sackett & DeVore, 2001), but gained attention after the Enron, Health South, and similar corporate scandals of the early 2000s. And there is little doubt that it would be considered "counterproductive" at both the individual and the organizational levels. A book by Vardi and Weitz (2004) presents extensive coverage of unethical managerial behavior represented in these corporate scandals. We can expect further examination of "O" behavior in the wake of the highly publicized scandals involving financiers such as Bernard Madoff and Allen Stanford in 2008–2009.

Other models for defining (e.g., Martinko, Gundlach, & Douglas, 2002) and measuring (e.g., Marcus, Schuler, Quell, & Humpfner, 2002) CWB are presented in an excellent special issue of the *International Journal of Selection and Assessment* in March/June 2002. Although many reports of the organizational effects of CWB are estimates of one type or another, more recent research has begun to tie CWB to more objectively measured organizational performance. As an example, researchers studied a fast-food franchise in Western Australia and found the CWB was associated with the loss of food (through waste or theft) and the amount of time a customer had to wait at the drive-through window for service (Dunlop & Lee, 2004). A second study done in the U.S. by Detert, Trevino, Burris, and Andiappan (2007) found similar results.

Let's consider three common counterproductive behaviors: dishonesty, absenteeism, and sabotage.

Dishonesty

Employee theft is a major issue in many organizations, particularly retail businesses. In 1993 Murphy estimated that annual losses to American corporations as a result of employee theft fell somewhere between 5 and 50 billion dollars. A recent estimate of the cost of theft at small businesses (Zipkin, 2004) places that value at almost \$130,000 per year, often perpetrated by bookkeepers and those with access to the company's assets. This

Dishonesty Employee theft of goods and theft of time (arriving late, leaving early, taking unnecessary sick days) or dishonest communications with customers, co-workers, or management.

Counterproductive work behavior (CWB) Voluntary behavior that violates significant organizational norms and threatens the well-being of the organization, its members, or both.



"I do take home some office property, but only because I'm building an exact replica of the office in my home."

SOURCE: © The New Yorker Collection 2005 Peter C. Vey from cartoonbank.com. All rights reserved.

Absenteeism Type of counterproductive behavior that involves failure of an employee to report for or remain at work as scheduled.

Absenteeism

Employers lose money with every employee absence, for an absent employee cannot be a productive employee. Although absence for reasons of illness or injury is, of course, recognized as legitimate, many employers strive to minimize these kinds of absences through stress reduction (Chapter 10) or increases in workplace safety (Chapters 10 and 14). The type of absenteeism that most attracts the interest of I-O psychologists, however, is "avoidable" absence: those occasions when an employee decides to stay away from work for reasons other than illness or injury. Nicholson and his colleagues (Chadwick-Jones, Nicholson, & Brown, 1982; Nicholson, Brown, & Chadwick-Jones, 1976) suggested that absenteeism is really a function of an informal agreement between a worker and a supervisor, or a worker's estimate of what is permitted by the organization. In Chapter 9, we will address the issue of absenteeism through the concepts of commitment and job dissatisfaction.

Sabotage Acts that damage, disrupt, or subvert the organization's operations for personal purposes of the saboteur by creating unfavorable publicity, damage to property, destruction of working relationships, or harming of employees or customers.

Sabotage

Employee sabotage can be defined as "the intention to damage, disrupt, or subvert the organization's operations for personal purposes of the saboteur by creating unfavorable publicity, damage to property, destruction of working relationships, or harming of employees or customers" (Crino, 1994, p. 312). In the early 1970s, at the height of the microassembly movement in automobile production, employers began to require line workers to complete their operations on a moving auto body in 30 seconds or less—a difficult, if not impossible, task. As stress and frustration among the workers grew, acts of sabotage increased. Workers intentionally dropped nuts and bolts into the engine, or neglected to anchor parts to the car body appropriately. This became known as the **Lordstown Syndrome**, named after one General Motors plant particularly plagued with these acts of sabotage. Although Chen and Spector (1992) found that high levels of sabotage were associated with low levels of satisfaction, this type of acting out clearly includes other dynamics as well. There are many dissatisfied workers in some work environments, yet few of them resort to sabotage. There is likely to be some combination of personality factors (e.g., extremely low levels of conscientiousness and emotional stability bordering on the pathological) and extremely high levels of dissatisfaction and alienation.

Lordstown Syndrome Act of sabotage named after a General Motors plant plagued with acts of sabotage.

may be a conservative estimate, as recorded theft is generally assumed to underestimate actual theft figures. Dishonesty involves more than employee theft of goods. It can also involve theft of time (arriving late, leaving early, taking unnecessary sick days) or dishonest communications with customers, co-workers, or management. Each of these behaviors lowers productivity by raising the cost of production, lowering output, or both. There is some research suggesting that theft, at least in part, may be precipitated by feelings of inequity and perceived violations of principles of justice (Baron, 2004b; Cropanzano, 2001; Neuman & Baron, 2005). Organizations typically attempt to control dishonesty through the modification of attitudes toward the organization, as we will discuss in Chapter 9; they also seek to screen it out by using selection batteries that include integrity and/or conscientiousness assessments (Chapter 3).

Causes of and Treatments for CWB

Current research seems to identify personality factors as most closely associated with CWB. However, proportionally speaking, CWBs are dwarfed by productive behaviors, so you should not jump to the conclusion that anyone with an implicated personality characteristic is likely to be involved in CWB. Factors such as situational constraints (e.g., opportunity to steal), feelings of injustice, and even individual need will also play a role. Detert and colleagues (2007) seem to confirm the obvious by reporting that closer supervision reduces CWB, and that punitive supervisory styles *increase* CWB. Beyond these findings, there are some intriguing studies that hint at the possible foundations for CWB. Marcus and Schuler (2004) apply some general theories of criminal behavior to CWB and propose that the key is the lack of self-control on the part of an individual. Roberts, Harms, Caspi, and Moffitt (2007) conducted a longitudinal study of New Zealand children as they progressed through adolescence and into young adulthood. They found that children and adolescents who were prone to conduct disorders (abusive to other children and adolescents, threatening, doing physical harm) were more likely to engage in CWB as young adult workers. Colbert, Mount, Harter, Witt, and Barrick (2004) find that employees high on conscientiousness and agreeableness, particularly if they like their work situation, are least likely to engage in CWB. Berry, Ones, and Sackett (2007) caution that individual deviance is predicted by different personality factors than organizational deviance. Other suggested culprits in the CWB scenario include narcissism (Penney & Spector, 2002), openness to experience (Salgado, 2002), negative emotion and anger (Spector & Fox, 2002), and low humility (Lee, Ashton, & Shin, 2005). Although this research is preliminary, there is a strong surge toward examining personality characteristics. Nevertheless, Dilchert, Ones, Davis, and Rostow (2007) do report some modest correlations between CWB and general mental ability in a study of police recruits. As in the case of explaining more general criminal behavior, explanations emphasizing one construct (whether personality or intelligence) are likely to prove too simplistic; still, they are at least a place to start.

One of the most intriguing and ambitious measurement projects for identifying individuals prone to aggression and CWB has been conducted by Larry James and colleagues (Bing, Stewart, Davison, Green, McIntyre, & James, 2007; Frost, Ko, & James, 2007; James, Ko, & McIntyre, 2008; LeBreton, Barksdale, Robin, & James, 2007). James proposes that aggression in the workplace actually stems from a flawed rationalization on the part of the aggressor that his or her behavior is justified. James has created a "test" that appears to assess reasoning but in fact is a hidden or implicit test of aggressive tendencies. Consider a sample item from his Test of Conditional Reasoning (James et al., 2008):

The old saying "an eye for an eye" means that if some hurts you, then you should hurt that person back. If you are hit, then you should hit back. If someone burns your house, then you should burn that person's house.

Which of the following is the biggest problem with the "eye for an eye" plan?

- It tells people to turn the other cheek
- It offers no way to settle a conflict in a friendly manner
- It can only be used at certain times of the year
- People have to wait until they are attacked before they can strike

The hidden aggressive response is "d." It appeals to aggressive individuals who see this as a problem since they cannot engage in a pre-emptive strike. Answer "b" is attractive to non-aggressive individuals because it implicitly accepts the notion that compromise and cooperation are more reasonable than conflict. Answers "a" and "c" are clearly illogical and hardly ever chosen by respondents, but they give the test the appearance of assessing reasoning rather than aggression.

Preliminary results from both laboratory and field settings are very promising using this technique. As an example, intramural basketball players who scored high on this hidden aggression test committed more egregious fouls, fighting, and verbal harassment of other players or officials. This is a fascinating new development, both from a conceptual and measurement perspective. It also appears to be immune from faking (LeBreton et al., 2007), probably because it is seen as a “reasoning” test rather than a personality or aggression test. We will be watching this area of research carefully over the next few years.

In part because the study of CWB is so new, we don’t know much about what actually prevents these behaviors. Certainly, the material presented in the previous paragraphs suggests that the answer to prevention is in selection—and there certainly seems to be some merit in that suggestion. Baron (2004) has reviewed basic social psychological literature and suggests several techniques unrelated to selection that might be used with incumbents. These include:

- Punishment that is prompt, certain, strong, and justified.
- Apologies to individuals unjustly treated as quickly and as genuinely as possible.
- Exposure to models (co-workers and supervisors) who do not engage in CWB even when provoked.
- Training in social and communication skills for individuals who might otherwise tend to interact in a provocative manner.
- Putting angry people in a better mood by using humor or expressing empathy.

At this stage, these tactics simply represent suggestions, but, again, they represent at least a good start.

OCB and CWB: Two Ends of the Same Continuum?

If you stop to consider our earlier discussion of OCB, you might wonder whether OCB is simply the opposite of CWB. You are not alone in that speculation. Many researchers and theorists are now proposing just that possibility, both in the more general literature dealing with prosocial behavior (Caprara & Pastorelli, 1993; Caprara, Steca, Zelli, & Capanna, 2005) and in the more specific context of the work setting (Miles, Borman, Spector, & Fox, 2002; Spector & Fox, 2002). Miles and colleagues (2002) suggest that emotions play a critical role: Positive emotions at work lead to OCB and negative emotions at work lead to CWB. Some researchers argue that since we can find co-occurrences of OCB and CWB in the same person, these must be distinct concepts (Kelloway, Loughlin, Barling, & Nault, 2002; Sackett, 2002). Recent research (Sackett et al., 2006) and a meta-analysis (Dalal, 2005) seem to support the view that CWB and OCB are two distinct behavior patterns and not just opposite ends of the same continuum. Practically, this means that it is necessary to use different assessment schemes for increasing OCBs or decreasing CWBs.

Proactive Work Behavior

Researchers (e.g., Frese & Fay, 2001) have proposed another possible aspect of work performance—proactive behavior. They argue that OCB is more a form of reactive performance. By that, they mean that an individual who engages in OCB is really responding to a clear need at the workplace to assist colleagues. Proactive behavior, in contrast, is more a matter of personal initiative when the need is not so obvious. Crant (2000) characterizes this form of behavior as challenging the status quo rather than passively

adapting to conditions. This construct could just as easily be treated as a personality characteristic or as a form of motivation, but to us, it seems to fit more neatly in the performance domain—at least for the time being. Rank, Carsten, Unger, and Spector (2007) studied proactive performance in sales personnel and found that it was as positively affected by the personality characteristic of personal initiative as organizational commitment, task complexity, and participative leadership styles. The authors distinguish between OCB and proactive behavior by seeing OCB as directed toward supervisors and co-workers and proactive behaviors as directed toward customers. Parker, Williams, and Turner (2006) demonstrated proactive behavior patterns in industrial workers in the U.K. But Frese and Fay (2001) acknowledge that proactive performance may result in negative outcomes if there are knowledge or skill gaps in the employee, if the employee decides to concentrate on an aspect of the business that is not considered important, or if the employee continues in the behavior when no progress is being made.

An example of a work behavior engaged in by an airline mechanic highlights the fine distinction between positive and negative proactive behavior. On January 1, 2003, a Frontier Airlines mechanic working at Denver International Airport was so concerned about the condition of a 737 jet about to take off for Dallas that he tossed a wheel chock into one of the engines to prevent the pilot from leaving the gate area and departing (Leib, Morgan, & Hughes, 2003). The mechanic had brought his concern to the attention of his supervisor, who nonetheless had decided that the plane was safe to depart, so the mechanic took matters into his own hands. The mechanic was suspended from his job and charged with a federal crime—destruction of an aircraft—which could result in a jail sentence of up to 20 years plus a \$250,000 fine. Was this an act of sabotage, or an instance of proactive behavior driven by personal initiative? The U.S. Attorney assigned to the case evidently thought it was closer to positive proactive behavior. The hearing in federal court was cancelled and the mechanic was put on probation. The U.S. Attorney, John Suthers, said “Mr. Cochran’s actions cannot be condoned, but his safety conscious motives need to be taken into consideration” (Lindsay, 2003).

As another example, consider the actions of some riders on a stalled Chicago subway train (Einhorn, 2008). After an hour of waiting, they left the train and walked down a tunnel to freedom, ignoring pleas of the conductor to wait for power to be restored. As a result, it was necessary to cut all power to the train line, stranding 1,000 other passengers on many other trains and shutting down service for 4 hours. Proactive behavior or stupidity?

This area of performance is very new. At present, the most useful research will be in distinguishing between negative proactive behavior and CWB, and between positive proactive behavior and OCB.

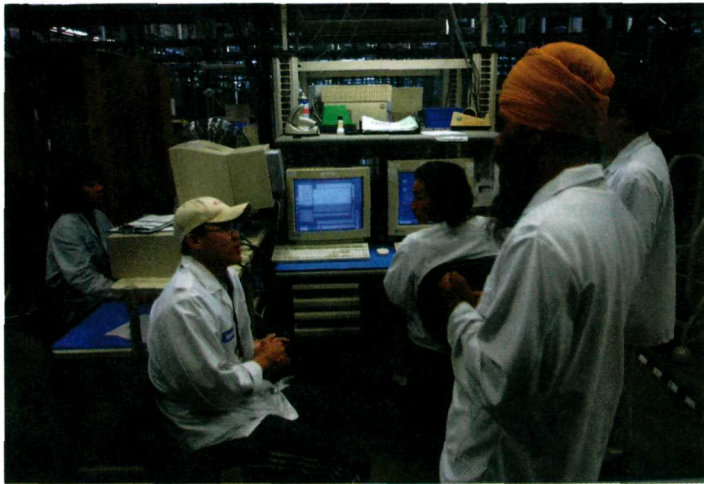
Adaptive Performance

Another performance component to consider is an area known as **adaptive performance** (Pulakos, Arad, Donovan, & Plamondon, 2000). A changing work environment puts increased importance on workers who are flexible and able to adapt to changing circumstances. Pulakos



Proactive behavior can have positive or negative consequences. In 2008, Chicago subway passengers worsened a transit snarl by evacuating a tunnel on their own initiative.

Adaptive performance
Performance component that includes flexibility and the ability to adapt to changing circumstances.



Globalization emphasizes the importance of adaptive performance, as it requires individuals to work in different cultures.

and colleagues cited the following circumstances of today's workplace that favor this adaptability:

- Changing technologies alter work tasks.
- Mergers, downsizing, and corporate restructuring require employees to learn new skills.
- Globalization requires individuals to work in different cultures.

For better or for worse, it is often emergencies that bring out the importance of adaptive behavior. An example of this was Hurricane Katrina, which devastated the Mississippi and Louisiana coastline and all but destroyed New Orleans in 2005. As we will describe in Chapter 14 when we discuss the importance of organization of effort, the

lack of organization in the government response to the disaster made it all the more important that individuals and nongovernmental groups be capable of adaptive performance. Consider the adaptability of the New Orleans-based Acadian Ambulance Company as described in Box 4.1.

Pulakos and colleagues (2000) proposed adaptive performance as a valid performance component that can be further divided into eight types of adaptive behavior. As Table 4.4 shows, each aspect of adaptability requires flexibility, but in a different way. "Cultural adaptability" involves an appreciation of differences in values, customs, and cultures, while "emergency or crisis situation" adaptability requires quick response, analysis, decision making, and action. Applying Table 4.4 to Box 4.1, we see that the Acadian Ambulance Company displayed the following characteristics of adaptive performance: handling

BOX 4.1 ACADIAN AMBULANCE COMPANY AND ADAPTIVE PERFORMANCE

The city's communication system was wiped out, but Acadian dispatchers kept working thanks to a backup power system and a portable antenna rushed here the day after the hurricane. As stranded patients wondered what happened to the city's medics and ambulances, Acadian medics filled in at the Superdome and evacuated thousands from six hospitals. While Louisiana officials debated how to accept outside help, Acadian was directing rescues by helicopters from the military and other states. . . . No government planners expected the only working radio network in New Orleans to be run by a private company, but Acadian had the flexibility to take on the job. . . . When the phone system failed,

. . . medics were ready with satellite phones. When the hurricane winds knocked over both the company's antennas in the New Orleans area, Acadian quickly located a mobile antenna and communications trailer owned by Iberia, a rural parish, west of New Orleans. The sheriff, fortunately, didn't ask FEMA for permission to move it to Acadian's command post across the river from the city.

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TABLE 4.4 Eight Adaptive Performance Areas and Definitions

Handling emergencies or crisis situations: Reacting with appropriate urgency in life-threatening, dangerous, or emergency situations; quick analysis and decision making in emergency situations; maintaining emotional control and objectivity.
Handling work stress: Remaining calm in spite of demanding workload or schedule; managing frustration with constructive solutions instead of blaming others; acting as a calming and settling influence on others.
Solving problems creatively: Uses unique types of problem analysis; generates new and innovative ideas in complex areas; considers a wide range of possibilities; thinks outside of the box.
Dealing with uncertain and unpredictable work situations: Taking effective action without having all the facts or information; easily changes gears; adjusts plans, goals, and schedules to match a changing situation; provides focus for self and others when situation is changing rapidly.
Learning work tasks, technologies, and procedures: Enthusiastic about learning new approaches and technologies; keeps knowledge and skill up to date; seeks out and participates in training that will prepare for changes in work demands.
Demonstrating interpersonal adaptability: Flexible and open-minded in dealing with others; considers others' viewpoints and opinions and alters own opinion when appropriate; works well with a wide diversity of people; accepts negative feedback without defensiveness.
Demonstrating cultural adaptability: Seeks to understand the culture of others; adapts easily to other cultures and behavior patterns; shows respect for others' values and customs; understands the implications of own behavior for maintaining positive relationships with other groups, organizations, or cultures.
Demonstrating physically oriented adaptability: Adjusts to challenging physical environments and extremes of temperature, noise, dirt, etc.; pushes self to complete physically demanding tasks; improves physical condition to meet job demands.

SOURCE: Adapted from Pulakos et al. (2000).

crises, handling stress, solving problems creatively, dealing with uncertainty, and physically oriented adaptability. Pulakos et al. (2000) have tested this taxonomy on a wide variety of jobs, and the results provided support for their propositions.

Although this research is very new, it appears promising. Pulakos and her colleagues (Pulakos, Dorsey, & Mueller-Hanson, 2005; Pulakos, Schmitt, Dorsey, Arad, Hedge, & Borman, 2002) have confirmed the eight-factor description of adaptability and identified some attributes that may predict adaptive performance, including cognitive ability, personality, and past experience. We conclude from the accumulating research that occupations will vary not only in the *extent* to which adaptability is required, but also in terms of the *type* of adaptive performance that is most critical.

A Brief Recap

From 1900 until 1980, I-O psychology dealt with work performance as a large homogeneous construct. Researchers seldom parsed performance into more discrete categories (e.g., technical or task performance, OCB, CWB). This was in contrast to a growing

appreciation for the value of breaking down predictors of performance (e.g., intelligence, personality, skill, knowledge) into discrete categories. With the introduction of the concept of OCB by Organ and his colleagues, that monolithic view of performance began to change. Today, we have a wide variety of criteria to choose from. The criterion categories include technical or task performance, OCB, CWB, adaptive performance, and now possibly proactive performance. This is a good place to be in. By parsing performance more finely, we can discover much more about the nature of work as well as considerably improve our prediction of worker success.

A Comprehensive Framework for Considering Performance: The “Great Eight”

Bartram (2005) has tried to combine some of the performance categories we have outlined above into a broader model of performance which he calls the “Great Eight” model of competencies. These competencies, which cover Campbell’s dimensions, OCB, and the adaptability concept of Pulakos, are presented in Table 4.5.

The Great Eight model has been validated in 29 different studies, including nine different countries, and over 4,800 study participants. As you can see from the right-hand column of Table 4.5, Bartram (2005) has also hypothesized which traits and abilities are likely to predict each of these competencies. He presents preliminary data suggesting that these guesses about the important attributes supporting these competencies may be fairly accurate.

More of these “super” models of performance are likely to appear in the next few years, but it is likely that they will build on the Great Eight model, just as the Great Eight model was a combination of earlier unconnected theories of performance. These new models will need to include at least CWB and possibly proactive performance. This represents a great stride forward in coming to some agreement about how we will choose to parse performance. Rather than seeing disconnected facets of performance, we have an integrated understanding of what underlies success at work, and how we might select those individuals likely to be good performers in a wide range of settings and circumstances.

The Case of Expert Performance

Most of us admire the performance of experts in various settings. We marvel at the intricacy of a world-class pianist or violinist, or the speed and ruthlessness of a master chess player. In our daily lives, we also appreciate **expert performance** when we encounter a software engineer who solves our computer problem in minutes after we have struggled fruitlessly for hours, or the garage mechanic who listens to our car for 30 seconds and is able to diagnose a problem deep in the bowels of the engine.

We tend to assume that such expertise is a result of an innate ability, a talent bestowed on few mortals and, unfortunately, not on us (Ericsson & Charness, 1994). This common assumption appears to be wrong. It is not that the experts are more intelligent or have faster reaction times. What separates the experts from you and me is depressingly simple: they practice. Of course, you may practice too and still not attain the level of the expert you admire. But the difference is in the *type* of practice and the *duration* of that practice. In virtually any area, including sports, music, chess, science, and work, people have become experts by following a demanding regimen. They have been practicing for at least 10 years, spend an average of 4 hours a day in practice, and their practice is deliberate (Ericsson & Charness, 1994).

Expert performance
Performance exhibited by those who have been practicing for at least 10 years and have spent an average of 4 hours per day in deliberate practice.

TABLE 4.5 The “Great Eight” Competencies

FACTOR	COMPETENCY DOMAIN TITLE	COMPETENCY DOMAIN DEFINITION	HYPOTHESIZED BIG FIVE, MOTIVATION, AND ABILITY RELATIONSHIPS
1	Leading and Deciding	Takes control and exercises leadership. Initiates action, gives direction and takes responsibility.	Need for power and control, extraversion
2	Supporting and Cooperating	Supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients and staff. Behaves consistently with clear personal values that complement those of the organization.	Agreeableness
3	Interacting and Presenting	Communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident and relaxed manner.	Extraversion, general mental ability
4	Analyzing and Interpreting	Shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Communicates well in writing.	General mental ability, openness to experience
5	Creating and Conceptualizing	Works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change.	Openness to experience, general mental ability
6	Organizing and Executing	Plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards.	Conscientiousness, general mental ability
7	Adapting and Coping	Adapts and responds well to change. Manages pressure effectively and copes well with setbacks.	Emotional stability
8	Enterprising and Performing	Focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal effects is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement.	Need for achievement, negative agreeableness

SOURCE: Bartram (2005).

In the world of work, you might wonder why there are not more experts, since many people perform their work duties for at least 4 hours a day and have been doing the same type of work for 10 years or more. The answer is that their activities do not constitute **deliberate practice**. In many, if not most, organizations, there is an acceptable level of performance and individuals are compensated for that level. There is no reason to become an expert, short of the intrinsic value of knowing you are an expert or the extrinsic value of being recognized by others as an expert. In addition, at work there is little opportunity for deliberate practice. Deliberate practice means “individualized training on tasks selected by a qualified teacher” (Ericsson, Krampe, & Tesch-Romer, 1993; Ericsson & Ward, 2007). To use a sports example, if you have trouble returning a tennis serve to your backhand, you may have an opportunity in the course of a typical set to practice that return 10 or 12 times with no feedback other than the flight of the tennis ball. Deliberate practice, in contrast, would be done with a coach who delivers hundreds of serves per hour to your backhand and provides feedback on technique after each serve. How many

Deliberate practice
Individualized training on tasks selected by a qualified teacher.

workers have the luxury of going back over a poorly performed task hundreds of times with the assistance of a personal coach?

The fact is, however, that we will encounter some expert workers in our work lives. Instead of thinking of them as “gifted” (i.e., the fortunate recipients of an innate God-given ability), think of them as dedicated and focused on their areas of expertise. These are individuals who have spent thousands of hours honing their skills over 10 or more years, with at least some form of deliberate practice. Golfer Tiger Woods and tennis player Andre Agassi are often thought of as prodigies because they came to national prominence in their respective sports as adolescents. What we often overlook, however, is that both of these stars began their deliberate practice before the age of 4—another indication that it takes 10 or more years to become an “overnight” success. As another example, in order to learn a particular piece (e.g., Bach’s *Italian Concerto*), a concert pianist may invest 34 hours per week of concentrated rehearsal over a period of 10 months. That’s the bad news. The good news is that the performance is flawless at the end of that period, and is close to flawless in many respects as long as 27 months later—with no rehearsal in between (Chaffin & Imreh, 2002).

Refer back to Module 4.1 and consider what Campbell’s performance model has to say about expert performance. Note particularly the importance of the three areas of DK, PKS, and M. The expert performer has increased declarative knowledge as well as procedural knowledge and skill through extensive and deliberate training (one of the precursors to DK and PKS), and has made the decision to persist in performing at high levels of effort. Not everyone has the time, energy, and desire to be a world-class performer at any activity. But whatever one’s baseline level of performance is, one can improve upon it by increasing DK, PKS, and M. And these performance determinants can, in turn, be increased with sustained deliberate practice. Recent research (Haerem & Rau, 2007) suggests that experts look at a problem much more deeply than novices do, most likely because of superior declarative knowledge. When the problem is truly complex, the expert outperforms the novice, but when the problem is relatively simple, the novice and expert perform equally.

Note that we have been talking about expert *performance*, which implies *doing* something better than someone else: hitting a golf ball, playing chess, playing the violin. But there are other forms of expertise. Weiss and Shanteau (2003) distinguish among four kinds of expertise in which a person may be better than others:

- Expert judges: award medals, assign grades, make diagnoses.
Evaluation plus qualitative or quantitative expression.
- Expert predictors: forecast weather, hire an employee, recommend a medical treatment.
Evaluation plus projection to a future event.
- Expert instructors: train and mentor.
Evaluation plus communication.
- Expert performers: play an instrument, fix an engine, perform a dance.
Evaluation plus execution.

What is common to *each* of these categories is that the expert is an outstanding *evaluator*. Whatever the type of expertise demanded, the

expert must be able to recognize the relevant aspects of the situation and decide what needs to be done. It is this recognition that comes from hours, days, months, and years of deliberate practice.

Types of Performance Measures

Most I-O literature distinguishes among different types of performance indicators; these indicators are concerned with how performance is indexed, not the nature of that performance (e.g., OCB, CWB, task performance). Three different categories have been suggested: objective measures, judgmental measures, and personnel measures (Guion, 1965).

Objective performance measures are usually a “count of the results of work” (Guion, 1965). This might mean the number of strokes it took a golfer to complete a round in a tournament. It could also mean the number of cases heard by a municipal judge, or the number of claims processed by an insurance adjuster.

Judgmental measures are evaluations of the effectiveness of an individual’s work behavior. The judgments are usually made by supervisors in the context of a yearly performance evaluation. Campbell and colleagues (1993) referred to evaluations as “expert” judgments. The supervisor is asked to consider the subordinate’s performance on a number of discrete aspects of performance, and to assign a rating that represents the supervisor’s assessment of that subordinate on each performance aspect. We will consider the process and elements of performance evaluation in greater detail in Chapter 5.

Employers typically keep a record of **personnel measures** in a personnel folder; these include such data as absences, accidents, tardiness, rate of advancement (in salary or job title), disciplinary actions, and commendations or notes of meritorious behavior. These measures usually record an event rather than an outcome (e.g., production measure) or an evaluation (e.g., a performance rating).

In light of Campbell’s model, we have reason to be concerned with most objective measures, as well as many of the personnel measures. Many would fail as indicators of performance because they are not under the complete control of the individual (e.g., total dollars in sales) or are not actual behaviors (e.g., promotional history). To return to Campbell’s point, as I-O psychologists, we should focus on individually controlled behavior when we examine performance (Campbell et al., 1993). In Campbell’s view, the type of measure most likely to yield a reasonable estimate of individual behavior is the judgmental measure (e.g., performance rating) that permits the evaluator to account for influences outside the control of the individual worker. For example, if a sales representative is assigned to a difficult sales territory, the manager is aware of that handicap and can adjust the judgment accordingly. If the manager were required to use an “objective” measure of sales success, the employee would be at a considerable disadvantage. It is not so much that objective measures are to be avoided or that ratings are to be preferred. They each have their advantages and disadvantages, as we will see in the next chapter. But it should be clear that, from the psychological perspective, objective measures are not performance—they are the results of performance.

Objective performance measure Usually a quantitative count of the results of work such as sales volume, complaint letters, and output.

Judgmental measure Evaluation made of the effectiveness of an individual’s work behavior; judgment most often made by supervisors in the context of a performance evaluation.

Personnel measure Measure typically kept in a personnel file including absences, accidents, tardiness, rate of advancement, disciplinary actions, and commendations of meritorious behavior.



An example of expert performance in medicine: The ability to evaluate diagnostic imaging that would be unintelligible to those lacking the necessary training and experience.

MODULE 4.2 SUMMARY

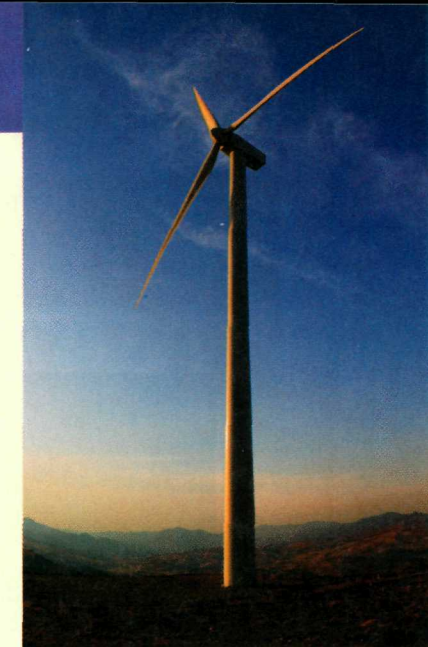
- I-O psychologists are increasingly interested in organizational citizenship behavior (OCB)—behavior that goes beyond what is expected on the job. This concept has been further developed to include extra-role behaviors which are contrasted with traditional views called *task* performance. Research indicates that measures of cognitive ability are most closely associated with task performance, whereas measures of personality do a better job of predicting OCB performance.
- I-O psychologists also study counterproductive work behaviors, including deviance directed toward the organization and toward other individuals. Three common counterproductive behaviors are dishonesty, absenteeism, and sabotage.
- Proactive work behavior is distinguished from OCB in that the latter is more a response to existing conditions, rather than an assertive (proactive) behavior aimed at changing conditions.
- Adaptive performance is a new component that can be added to Campbell's performance model. Research suggests that occupations vary not only in the *extent* to which adaptability is required, but also in the *type* of adaptive performance that is most critical.
- I-O psychologists commonly distinguish among different types of performance indicators. Three categories commonly discussed are objective measures, judgmental measures, and personnel measures.

KEY TERMS

organizational citizenship behavior (OCB)	dishonesty	deliberate practice
altruism	absenteeism	objective performance measure
generalized compliance	sabotage	judgmental measure
task performance	Lordstown Syndrome	personnel measure
counterproductive work behavior (CWB)	adaptive performance	
	expert performance	

MODULE 4.3

Job Analysis: Fundamental Properties and Practices



Job analysis Process that determines the important tasks of a job and the human attributes necessary to successfully perform those tasks.

In earlier chapters, we have used the term **job analysis** in a general sense to mean a process that determines the essence of a collection of tasks falling within the scope of a particular job title. We will now consider that process in much greater detail.

The purpose of a job analysis is simple. The analyst wants to understand what the important tasks of the job are, how they are carried out, and what human attributes are necessary to carry them out successfully. In short, job analysis is an attempt to develop a theory of human behavior about the job in question. This theory will include performance expectations (properties of the job in the context of the organization's expectations) as well as the required abilities, knowledge, experience, skill, and personal characteristics necessary to meet those expectations.

The Uses of Job Analysis Information

The results of a job analysis can be used for many different purposes, including:

Job Description

This is a list of the type of tasks that are carried out, the required worker attributes, and training and experience requirements. Job descriptions are very useful for recruiting.

Recruiting

If we know what the job requires and which human attributes are necessary to fulfill those requirements, we can target our recruiting efforts to specific groups of potential candidates. For technical jobs, these groups might be defined by credentials (a bachelor's degree in engineering) or experience (five years of programming in C++).

Selection

Once we know the attributes most likely to predict success in a job, we can identify and choose (or develop) the actual assessment tools. Based on the job analysis, we may choose a personality test that measures the Big 5, a commercially available test of general mental ability or reasoning, or develop an interview format intended to get at some subtle aspects of technical knowledge or experience.

Training

A job analysis helps us to identify the areas of performance that create the greatest challenge for incumbents; based on this, we can provide preassignment or postassignment training opportunities. We may discover that in automobile manufacturing subassembly, one of the most troublesome tasks is installing the dashboard console without pinching the bundled wiring that powers the displays on that dash. Newly hired assembly line workers who will be assigned to that subassembly task can receive specific training modules designed to help them perform this task better. Modules can also be prepared for the line supervisors who direct that subassembly operation so that they can follow up the initial training with online coaching.

Compensation

Since a job analysis identifies the major performance components and expectations for each job, management can place a monetary value to the organizational mission on each of those components. Management can also determine the level of performance expected on each of those components for each job in the organization as a way of identifying the comparative value of each job. These components and levels of performance can then help set the budget for the organization's human resources. An organization may decide, for example, that rapidly changing technology makes its market so unstable that it will place higher value on demonstrated individual adaptability (as defined above by Pulakos et al., 2000) and non-job-specific task proficiency (as defined above in Campbell's model), and less value on written and oral task communication proficiency or the maintenance of personal discipline (from the Campbell model). This means that jobs that depend heavily on the first two performance components will pay better than jobs with heavy concentrations of the latter components.

Promotion/Job Assignment

The concept of a **job ladder** or **job family** is based on the observation that a particular job may have closer connections to a subset of other jobs than to a job chosen at random. Accounting jobs are closer to budgeting and invoicing positions than they are to engineering or production positions. Job analysis permits the identification of clusters of positions that are similar, either in terms of the human attributes needed to be successful at them or in terms of the tasks carried out in those jobs. This in turn allows the organization to identify logical career paths and the possibility of transfer from one career ladder to another.

Job Design

A comprehensive job analysis can assist in design changes for eliminating or automating tasks in a job. Examples include tasks that are particularly dangerous (e.g., welding an auto body in the assembly process) or are associated with high performance failures (e.g., preparing neonatal feeding solutions in which minute differences in ingredients could harm, or even kill, a newborn baby). It may also be advisable to automate tasks associated with inefficient use of workers' time; consider the examples in Box 4.2.

Workforce Reduction/Restructuring

Mergers, acquisitions, downsizing, and rightsizing are all terms that imply job changes—often involuntary ones on the part of the employees. Mergers and acquisitions call for identifying duplicative positions and centralizing functions. The challenge is to identify which positions are truly redundant and which provide a unique added value. In downsizing and rightsizing interventions, positions with somewhat related tasks are often consolidated

BOX 4.2 JOB ANALYSIS AND JOB DESIGN

The interface between work design and performance demands can present interesting situations. Generally, the question is when to have a work design characteristic override an individual behavior. Consider the two following examples.

Left-hand turns are one of life's built-in inconveniences. We seem to sit endlessly, waiting for oncoming traffic to break in order to make the turn. We wait whether there is a protected left turn arrow or not. It is a waste of time and fuel. But is there any alternative? United Parcel Service found one by instituting a computer-driven mapping system known as DIAD (Delivery Information Acquisition Device) that uses right-hand turns wherever possible (Lovell, 2007). Using DIAD, during 2006 UPS eliminated 28.5 million (yes, million!) miles from its delivery routes, resulting in a reduction of fuel by 3 million gallons, and a reduction in CO₂ emissions of 31,000 metric tons. The next time you are in a left-hand turn lane and see no Big Brown trucks in line with you, consider that UPS has taken a possibly faulty driver decision out of the performance mix.

Another one of life's seemingly inevitable inconveniences is e-mail overload. One consulting firm estimated that a typical information worker in a high-tech firm accesses e-mail 50 times per day and instant messaging 75 times per day (Richtel, 2008). This nonstop communicating has contributed to cutting the "thinking and reflecting" time so crucial for product development down to 12 percent of the work day. The major issue is not the seconds it takes to review an e-mail, it is the interruption of thought and the reordering of tasks that creates the greatest productivity loss—it has even led to a physical habit that one writer refers to as e-mail apnea (holding one's breath upon seeing the sheer volume of e-mails in the in-box). Recognizing the problem, several high-tech firms (Google, IBM, Intel, Microsoft) created a nonprofit group dedicated to helping employees stop the flood and reclaim lost creative time. Google introduced a software support



A winning job design initiative: Using DIAD (Delivery Information Acquisition Device), UPS drivers saved 3 million gallons of fuel and reduced CO₂ emissions by 31,000 metric tons during 2006.

called E-Mail Addict that can disconnect e-mail so that the user does not see or hear newly arrived messages. When E-Mail Addict's "take a break" feature is activated, the e-mail screen turns gray and reads "Take a walk, get some real work done, or have a snack. We'll be back in 15 minutes." As another strategy, one Intel location encouraged face-to-face communication by declaring "zero e-mail Fridays." While employees liked the idea in theory, they continued to send e-mail messages, finding them essential.

SOURCE: Lovell (2007); Richtel (2008).

Job ladder or job family
Cluster of positions that are similar in terms of the human attributes needed to be successful in those positions or in terms of the tasks that are carried out.

into a single position. The job descriptions of those who stay with the organization are enlarged, with the result that fewer people assume more responsibilities. In both the merger/acquisition and the downsizing/rightsizing scenarios, management's key role is deciding which tasks to fold into which positions; detailed job analyses provide a template for making these decisions rationally.

Criterion Development

As you will recall from our discussion of validity in Chapter 2, the criterion is the behavior that constitutes or defines successful performance of a given task. It is the dependent variable in criterion-related validity studies. Independent variables such as scores on a test of mental ability are correlated with criterion measures to demonstrate that those scores are valid predictors of probable job success. In content-related validity studies, as we saw in Chapter 2, the I-O psychologist establishes logical links between important task-based characteristics of the job and the assessment used to choose among candidates. It is the job analysis that provides the raw material for criterion development. For example, in a criterion-related validity study of a problem-solving test for software engineers, a job analysis might tell us that one of the engineer's most common and important tasks is to identify a flaw in a software program. As a result, we might then develop a measure of the extent to which the engineer does consistently identify the flaw without asking for assistance. This measure might be in the form of a rating scale of "troubleshooting" to be completed by the consultant's supervisor. We would then have both the predictor score and a criterion score for calculating a validity coefficient.

Performance Assessment

An extension of the use of job analysis for criterion development is the development of performance assessment systems. Once the job analyst identifies critical performance components of a job, it is possible to develop a system for evaluating the extent to which an individual worker has fallen short of, met, or exceeded the standards set by the organization for performance on those components. We will deal with the issue of performance evaluation in detail in Chapter 5.

Litigation

When tests or other assessment practices are challenged in court, the employer must provide evidence that the test or assessment practice is valid or job related, regardless of what validity model (e.g., criterion/content/construct) is used. The first step in such a defense is demonstrating that the employer truly knows which critical tasks define the job in question, as well as the attributes necessary to perform those tasks. Job analysis information is the easiest way to demonstrate that knowledge base. In addition, as we will see later in this chapter, job analysis can be used to distinguish between those workers entitled to overtime pay (i.e., non-exempt) and those who are not (exempt). This is an important distinction because exempt status is the crux of many lawsuits involving the right to overtime pay. The various applications of job analysis are covered in great detail in a recent book by Brannick, Levine, and Morgeson (2007) as well as a reviews by Levine and Sanchez (2007) and Pearlman and Sanchez (2009).

A Brief History of Job Analysis

Wilson (2007) presents a detailed history of job analysis in a comprehensive treatment of the foundations of I-O psychology edited by Koppes (2007). Nevertheless, it is interesting to

begin our treatment with a short historical perspective. One of the first I-O psychologists to introduce standardized job analysis was Morris Viteles. As early as 1922, he used job analysis to select employees for a trolley car company (Viteles, 1922). An example of his job analysis areas is presented in Figure 4.6, showing how the technique was applied to the job of quiller in a knitting mill. As you can see, the analyst first described the duties of the incumbent, then the nature and conditions of work, and finally some basic qualifications. Having done that, the analyst then completed a form called a **job psychograph**, which displayed the mental requirements of the job (see Figure 4.7). We present these artifacts to show that the purpose of job analysis—understanding the behavioral requirements of work—has not changed in over 85 years. It was then and is now the analyst's best attempt at developing a theory of work performance.

Over the years, experts have presented many different systems to accomplish job analysis. There are many excellent reviews of these systems (Gael, 1988; Brannick et al., 2007), but since many are no longer in use, we will not describe them here. What we can say is that these systems became increasingly detailed over the decades, with greater concentration on tasks and less concentration on human attributes. Fortunately, that trend has been reversed in recent years, and we will present some newer systems that have brought I-O psychology back to an examination of the behavioral roots of work.

Types of Job Analysis

As you saw from the examples above, the purpose of a job analysis is to combine the task demands of a job with our knowledge of human attributes and produce a theory of behavior for the job in question. There are two ways to approach building that theory. One is called the **work- or task-oriented job analysis**; this approach begins with a statement of the tasks the worker actually performs, the tools and machines used, and the work context. A second method is called the **worker-oriented job analysis**; this approach begins by focusing on the attributes and characteristics of the worker necessary to accomplish the tasks that define the job (Brannick et al., 2007). The following example might help to clarify the distinction. For the job of a snow-cat operator at a ski slope, a work- or task-oriented job analysis might include the statement:

Operates Bombardier Sno-Cat, usually at night, to smooth out snow rutted by skiers and snowboard riders, and new snow that has fallen.

In contrast, a worker-oriented job analysis statement might be:

Evaluates terrain, snow depth, and snow condition and chooses the correct setting for the depth of the snow cut, as well as the number of passes necessary on a given ski slope.

Regardless of which approach is taken, the next step in the job analysis is to identify the attributes—the **KSAOs** we covered in Chapter 3 on individual differences—that an incumbent needs for either performing the tasks or executing the human behaviors described by the job analysis. KSAOs can be defined as follows:

- **Knowledge:** "A collection of discrete but related facts and information about a particular domain . . . acquired through formal education or training, or accumulated through specific experiences" (Peterson, Mumford, Borman, Jeanneret, & Fleishman, 1999, p. 71).

Job psychograph Early form used in a job analysis to display the mental requirements of the job.

Task-oriented job analysis Approach that begins with a statement of the actual tasks as well as what is accomplished by those tasks.

Worker-oriented job analysis Approach that focuses on the attributes of the worker necessary to accomplish the tasks.

KSAOs Individual attributes of knowledge, skills, abilities, and other characteristics that are required to successfully perform job tasks.

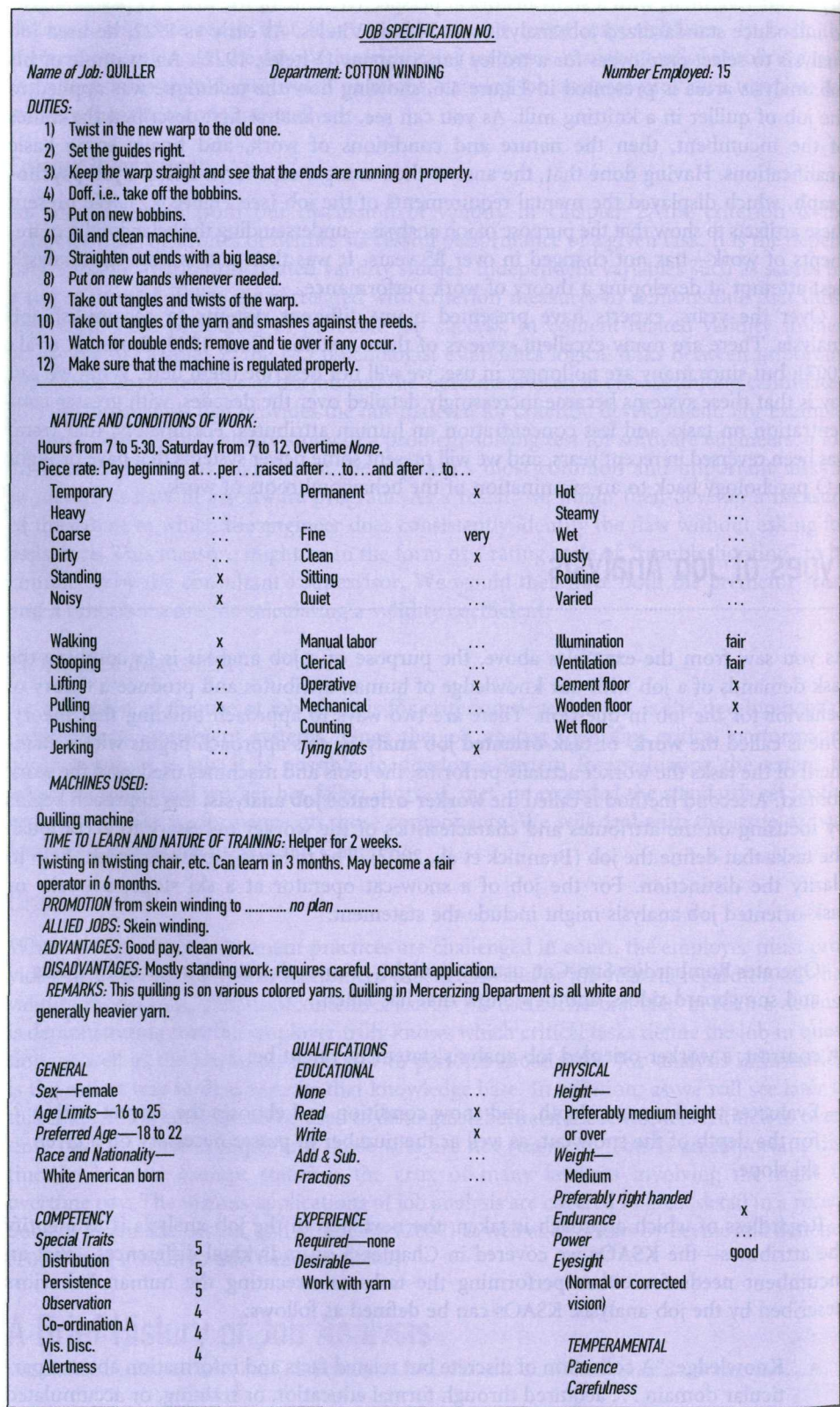


FIGURE 4.6 An Early Example of Job Analysis

SOURCE: Cades (1924); cited in Viteles (1932).

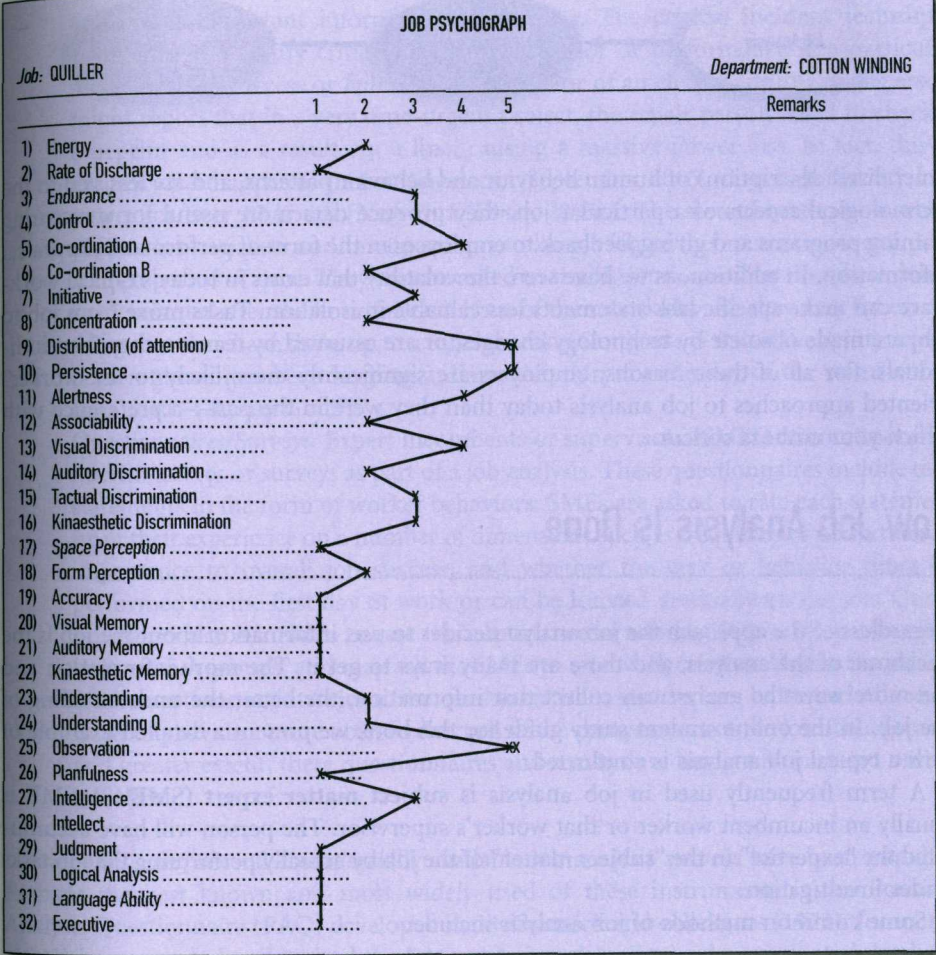


FIGURE 4.7 The Job Psychograph of Viteles

SOURCE: Viteles (1932).

- **Skill:** a practiced act.
- **Ability:** the stable capacity to engage in a specific behavior.
- **Other characteristics:** personality variables, interests, training and experience.

Finally, when the appropriate KSAOs are identified, tests and other assessment techniques can be chosen to measure those KSAOs (see Figure 4.8).

Job analysis methods have evolved using both work or task-oriented and worker-oriented systems (e.g., Fine, 1988; McCormick, Jeanneret, & Mecham, 1972). Since both approaches end up in the same place—a statement of KSAOs—neither can be considered the “right” way to conduct a job analysis. For practical purposes, since worker-oriented job analyses tend to provide more



Drivers lacking the required skills and abilities are likely to have accidents.

FIGURE 4.8 The Role of Job Analysis in Assessment



generalized descriptions of human behavior and behavior patterns, and are less tied to the technological aspects of a particular job, they produce data more useful for structuring training programs and giving feedback to employees in the form of performance appraisal information. In addition, as we have seen, the volatility that exists in today's typical workplace can make specific task statements less valuable in isolation. Tasks move from job to job, are made obsolete by technology changes, or are assumed by teams rather than individuals. For all of these reasons, employers are significantly more likely to use worker-oriented approaches to job analysis today than they were in the past—a preference with which your authors concur.

How Job Analysis Is Done

Regardless of the approach the job analyst decides to use, information about the job is the backbone of the analysis, and there are many ways to get it. The more information and the more ways the analyst can collect that information, the better the understanding of the job. In the online student study guide for this book we present a detailed example of how a typical job analysis is conducted.

A term frequently used in job analysis is **subject matter expert (SME)**. A SME is usually an incumbent worker or that worker's supervisor. The person will have accumulated the "expertise" in the "subject matter" of the job by actually performing the job tasks under investigation.

Some common methods of job analysis include:

1. **Observation.** This was perhaps the first method of job analysis I-O psychologists used. They simply watched incumbents (SMEs) perform their jobs and took notes. Sometimes they asked questions while watching, and not infrequently they even performed job tasks themselves. Near the end of the Second World War, Morris Viteles studied the job of navigator on a submarine. He attempted to steer the submarine toward the island of Bermuda. After five not-so-near-misses of 100 miles in one direction or another, one frustrated officer suggested that Viteles raise the periscope, look for clouds, and steer toward them (since clouds tend to form above or near land masses). The vessel "found" Bermuda shortly thereafter. One of your authors has observed or participated in jobs as diverse as police patrol, iron ore mining 4 miles beneath the surface north of the Arctic Circle, cookie packing, airport runway repair, packing baggage into the cargo hold of a Boeing 727 and 747, nuclear control room operation, overhead crane operation, and piloting a 100,000-ton container ship into the Seattle harbor. The more jobs one seriously observes, the better one's understanding becomes of not only the jobs in question, but also of work in general.
2. **Interviews.** It is important to supplement observation by talking with incumbents, either at the worksite or in a separate location. These interviews are most effective when structured with a specific set of questions based on observations, other analyses of the types of jobs in questions, or prior discussions with HR reps, trainers, or managers knowledgeable about the jobs.

Subject matter expert (SME)
Employee (incumbent) who provides information about a job in a job analysis interview or survey.

3. **Critical Incidents and Work Diaries.** I-O psychologists have used other techniques to capture important information about jobs. The **critical incident technique** asks SMEs to identify critical aspects of behavior or performance in a particular job that led to success or failure. The supervisor of an electric utility repair person might report that in a very time-urgent project, the repair person failed to check a blueprint and as a result cut a line, causing a massive power loss. In fact, this is exactly what happened in Los Angeles in September 2005 when half the city lost power for over 12 hours (*New York Times*, 2005c). The second method—a **work diary**—asks workers and/or supervisors to keep a log of their activities over a prescribed period of time. They may be asked to simply jot down what they were doing at 15 minutes after the hour for each hour of their work day. Or they may list everything that they have done up to a lunch break. (Our guess is that if the utility repair person above had been keeping a diary, the entry for the day of the error would have read "Oh, my God!")
4. **Questionnaires/Surveys.** Expert incumbents or supervisors (SMEs) often respond to questionnaires or surveys as part of a job analysis. These questionnaires include task statements in the form of worker behaviors. SMEs are asked to rate each statement from their experience on a number of dimensions such as frequency of performance, importance to overall job success, and whether the task or behavior must be performed on the first day of work or can be learned gradually on the job. Questionnaires also ask SMEs to rate the importance of various KSAOs for performing tasks or task groups, and may ask the SMEs to rate work context. Unlike the results of observations or interviews, the questionnaire responses can be statistically analyzed to provide a more objective record of the components of the job. To a greater and greater extent, these questionnaires and surveys are being administered online to SMEs.

Critical incident technique
Approach in which subject matter experts are asked to identify critical aspects of behavior or performance in a particular job that led to success or failure.

Work diary
Job analysis approach that requires workers and/or supervisors to keep a log of their activities over a prescribed period of time.

Over the years, several commercially available job analysis surveys have been popular. Perhaps the best known and most widely used of these instruments is the Position Analysis Questionnaire (PAQ) developed by McCormick and colleagues (1972). Jeanneret (1992) has expanded and revised the PAQ system and maintained a substantial database of job analysis information for many occupations over the 40 years of its use. Other survey-based systems include the Fleishman Job Analysis System (based on the Fleishman taxonomy that we referred to in Chapter 3); the Occupational Analysis Inventory (Cunningham, Boese, Neeb, & Pass, 1983), best suited for occupational education and guidance work; and the Common Metric Questionnaire (CMQ) developed by the Psychological Corporation (1993). A book published by the National Research Council (1999) provides an excellent description of several of these commercially available systems. Most commercial consulting companies have web-based expert job analysis systems that match the essential functions of jobs with the human attributes required to complete those essential functions.

MODULE 4.3 SUMMARY

- Job analysis attempts to develop a theory of human behavior about the job in question. This theory includes performance expectations as well as the experience and KSAOs necessary to meet those expectations.
- The results of a job analysis can be used for many different purposes, including job description, recruiting, selection, training, compensation, job design, criterion development, and performance assessment.
- Job analysis methods are often broken down into two different but related approaches: a task-oriented approach and a worker-oriented approach. Whichever approach is initially selected, the next step in a job analysis is to identify the KSAOs that an incumbent needs for performing the tasks or executing the human behaviors described in the job analysis.
- There are many ways to obtain job analysis information, including observation, interviews, critical incidents, work diaries, and questionnaires or surveys. The more ways the analyst can collect information, the better the understanding of the job.

KEY TERMS

job analysis	task-oriented job analysis	subject matter expert (SME)
job ladder or job family	worker-oriented job analysis	critical incident technique
job psychograph	KSAOs	work diary

MODULE 4.4

Job Analysis: Newer Developments



Electronic Performance Monitoring as Part of a Job Analysis

In the 1980s and 1990s, the introduction of computers and other technology-based information networks into the workplace clearly revolutionized planning, production, and distribution. But this technology has introduced another, less obvious, opportunity: the opportunity to monitor work processes, both actively and passively. When a commercial airplane crashes, investigators scramble to find the two “black boxes” containing the voice recorder and the event recorder. The voice recorder may reveal certain information about the accident—what the cabin crew heard and saw—and the event recorder may reveal independent information—altitude, position of flaps and throttle, and so on. The flight can be “monitored” after the fact.

In many jobs, similar monitoring can occur during work as well as after the fact. Consider the phone call you make to ask a question about your telephone bill, or to order theater tickets. A recorded message will tell you that your “call may be monitored for quality control purposes.” That means that the performance of the agent or representative with whom you are talking is being monitored and “critical incidents” in success and failure can be identified. Similarly, the new and powerful planning and monitoring system that tells UPS drivers how to drive their route by eliminating left-hand turns can also provide information about how *fast* they make their deliveries. That software can provide information about the actual delivery behavior of the driver, alerting him or her (and a supervisor) when they are running “behind” schedule. Unfortunately, that software cannot recognize when a driver is required to wait for a loading dock to open up, or when a driver is making 15 deliveries to a single address that is a co-op building in New York City. As you might expect, drivers in congested city environments are not amused when told they are “running behind” a schedule monitored by a computer and a GPS.

The good news for employers about **electronic performance monitoring** is that many jobs lend themselves to producing job analysis information without any input at all from SMEs. Since the system records the actions of workers, it is a simple step to develop a frequency count of those actions, telling the analyst how often the action occurs in a day or week. Frequency is often highly correlated with the importance of a task. Electronic performance monitoring can be very cost effective and has the potential for providing detailed and accurate work logs.

Indeed, the practice of monitoring without SME input is not unique to the digital age. One of the jobs discussed in Barbara Garson’s book on boring work (Garson, 1994) was

Electronic performance monitoring Monitoring work processes with electronic devices: can be very cost effective and has the potential for providing detailed and accurate work logs.

that of a Blue Shield insurance claims adjuster. The adjuster's performance output was monitored regularly—and that was in 1970. In a more recent example, Sanchez and Levine (1999) described truck leasing companies that monitor driver performance by hooking an onboard computer to the truck engine and tracking speed, idle time, and other characteristics of driving behavior. The dark side, of course, is related to employee privacy rights and perceptions of fairness. Workers generally dislike the fact that their performance can be "tracked" electronically because the tracking is most often used to identify errors in performance or violations of work rules rather than instances of outstanding performance. If the new technology of the workplace is to provide raw material for job analysis, there will need to be checks and balances to ease workers' concerns regarding punitive actions by the employer. In Chapter 5 on performance measurement, we will cover electronic monitoring in more detail from the employee's perspective.

Cognitive Task Analysis

In line with the movement toward worker-oriented job analysis, experts have suggested that **cognitive task analysis** is a needed extension of traditional job analysis procedures (Diaper & Stanton, 2004; Vincente, 1999). Most job analyses concentrate on observable behavior—either task completion or action patterns. But cognitive behavior is not directly observable, so a new technique must be used. DuBois, Shalin, Levi, and Borman (1998) describe cognitive task analysis as a method of decomposing job and task performance into concrete units, with an emphasis on identifying mental processes and knowledge required for task completion.

A precursor of cognitive task analysis is a technique known as a **think-aloud protocol** (Ericsson & Simon, 1993), which cognitive psychologists have been using for many years to investigate the manner in which experts think in order to achieve high levels of performance (Goldstein & Ford, 2002). In a think-aloud protocol, an expert performer actually describes in words the thought process that he or she uses to accomplish a task. An observer/interviewer takes notes and may ask some follow-up questions based on what the performer says. In this way, the unobservable becomes observable. As an example, Ericsson and Charness (1994) reproduced the think-aloud protocol of a person who was able to correctly multiply 24 by 36 mentally (i.e., without the use of a paper and pencil):

36 times 24
4
carry the—no wait
carry the 2
14
144
0
36 times 2 is
12
6
72
720 plus 144
4
uh uh
6
8
uh, 864

Cognitive task analysis
Consists of methods for decomposing job and task performance into discrete, measurable units, with special emphasis on eliciting mental processes and knowledge content.

Think-aloud protocol
Approach used by cognitive psychologists to investigate the thought processes of experts who achieve high levels of performance; an expert performer describes in words the thought process that he or she uses to accomplish a task.

The focus is not on the KSAOs that the expert calls upon, but the cognitive operations employed. Put another way, cognitive task analysis concentrates on *how* behavior occurs rather than on *what* is accomplished. It is not that the old methods are replaced with cognitive task analysis. Instead, cognitive task analysis is added to the job analysis toolbox. Goldstein and Ford (2002) made the following distinction:

Rather than looking at tasks and KSAOs as separate entities, a cognitive task analysis approach attempts to link tasks and KSAOs based on the flow from the goals of the people completing a task to the various actions a person might take in performing the task. An examination of the differences between experts and novices in terms of goals and actions can help identify areas for training and development to transform novices toward expertise. (p. 96)

As the workplace becomes more technologically complex and volatile, it is clear that the old methods of task-based observation and interview will be ineffective in describing many of the more critical cognitive operations that lead to success. Much of the work done involves diagnosis, problem solving, and planning—activities that are not easy to observe.

Cognitive task analysis is time consuming and requires a good deal of expertise to do well. As a result, it may be a luxury for low-level jobs or jobs in which the cost of a mistake is small. But for critical positions where the consequence of an error is extremely high, cognitive task analysis may be a useful addition to the job analysis arsenal. DuBois (1999) suggested that employers consider the following indicators to determine whether a cognitive task analysis may be worthwhile:

- Persistent performance problems.
- Costly errors or accidents.
- Training is difficult to transfer to job behavior.
- Achieving high levels of performance takes a long time.

Cognitive task analysis clearly falls into the worker-oriented approach to job analysis rather than the task- or work-oriented approach. Table 4.6 contrasts cognitive task analysis with work-oriented job analysis.

TABLE 4.6 Cognitive Task Analysis versus Work-Oriented Job Analysis

WORK-ORIENTED TASK ANALYSIS	COGNITIVE TASK ANALYSIS
Emphasizes behavior	Emphasizes cognitive
Analyzes target performance	Analyzes expertise and learning
Evaluates knowledge for each task	Evaluates the interrelations among knowledge elements
Segments tasks according to behaviors required	Segments tasks according to cognitive skills required
Representational skills are not addressed	Representational skills are addressed
Describes only one way to perform	Accounts for individual differences

SOURCE: Brannick et al. (2007), Table 3.8, p. 84. © 2007 by Sage Publications Inc. Books. Reproduced with permission of Sage Publications Inc. Books in the format Textbook via Copyright Clearance Center.

Cognitive task analysis can be accomplished using a number of methods, all quite new and relatively untested. Nevertheless, because cognitive task analysis is a genuine advance in the understanding of work, I-O psychologists are confident that this area will grow quickly. Your authors predict that by the year 2010 cognitive task analysis will become a common part of a job analysis and will likely extend down to lower-level jobs from upper-level jobs where it was first used.

The Context of Work

The “job” of a wide receiver on a professional football team is to run as far and as fast as he can and catch a football. That is the *content* of the work. The **context of the work** changes that job just a bit. The complete job description, including the context, might read as follows:

Runs as fast as possible down a wet and slippery field, first avoiding the legal attempt by a defensive back to separate the wide receiver’s head from his shoulders, at a point 15 yards past the line of scrimmage, cutting inches behind a crossing tight end teammate and defender who collectively weigh 500 pounds and are moving at the speed of light, in order to catch a pass with the velocity and girth of an artillery shell while another defender is pulling his jersey with one hand and reaching down his throat with the other, anticipating that within a second, an additional defender will attempt to embed his helmet several inches deep in the wide receiver’s lower back and kidney area.

That is the “contextualized” job of a wide receiver. While the workplace is not usually as sensationalized as the football field, there are conditions of work or context that can change the demands on the incumbent. Communicating with a co-worker may seem like a simple task unless it is attempted in the midst of noise and dangerous moving equipment such as lift trucks and overhead cranes. Explaining a procedure may seem like a simple task until the explanation is being given by a police officer to an irate motorist who has been given a ticket for speeding past a stopped school bus. Tasks are not performed in a void; instead, they are performed in a context that includes interpersonal, physical, and structural characteristics. Some (McCormick et al., 1972), but not all, systems of job analysis include a consideration of the work context. For some occupations (e.g., administrative work), the context may play a minor role in performance, but in others (e.g., public safety, the military, heavy industrial work), the work context may completely transform the job demands, requiring additional cognitive or physical abilities or higher levels of certain personality attributes.

Strong, Jeanneret, McPhail, Blakley, and D’Egidio (1999) developed a taxonomy for describing the work context. Their taxonomy suggests that context has three different aspects: interpersonal relationships, physical work conditions, and structural job characteristics, each with its own unique facets. By using these facets, we can make reliable distinctions among various occupational groups, such as managers, nurses, janitors, and maintenance repair personnel.

There are many potential advantages to including work context variables in job analysis. As mentioned above, context may help define the requisite KSAs for a successful incumbent. In addition, workers are traditionally compensated with premium pay for unusually difficult, hazardous, or unappealing work, so context may play a role in compensation policies. Finally, knowledge of context may help an employer to portray the less attractive characteristics of the job more realistically to prospective employees (Strong et al., 1999). Incomplete knowledge of work context often leads to early turnover by new employees. This early turnover is expensive, given the time and energy that went into selection,

Context of the work
Conditions or characteristics of work that can change the demands on the incumbent; includes interpersonal relationships, physical work conditions, and structural job characteristics.

orientation, and training. It is better to have a candidate decline an offer based on full knowledge of the job and the work context than to have a candidate with incomplete knowledge accept the position and then leave after two weeks.

A popular technique for providing practical information about a prospective job is called the **realistic job preview (RJP)**. RJPs include task information as well as information about the context of the work (Phillips, 1998). For the position of bank teller, RJP information would include things like the nature of the training program, the importance of accuracy, the time pressure of the work, the nature of customers (including rude ones), pay and promotion rates, and how to move into management. Wanous and Dean (1984) found that employees who did not receive RJPs for bank teller positions tended to leave after six months, whereas those receiving RJPs often withdrew before or during training. Expanding upon these findings, Phillips (1998) found that RJPs led to higher levels of performance for those who stayed, as well as lower levels of both voluntary resignations and involuntary terminations.

Personality-Based Job Analysis

As you read in Chapter 3, personality measures have become very popular in industrial selection. But historically, job analysis instruments ignored personality attributes and concentrated on abilities, skills, and, less frequently, knowledge. Guion and his colleagues (Guion, 1998; Raymark, Schmit, & Guion, 1997) developed a commercially available job analysis instrument, the **Personality-Related Position Requirements Form (PPRF)**, devoted to identifying personality predictors of job performance. This instrument is intended not to replace other job analysis devices that identify knowledge, skills, or abilities, but to supplement job analysis by examining important personality attributes in jobs. Guion enlisted 145 experienced I-O psychologists to nominate and evaluate the relevance of 44 different aspects of personality for work performance. A subsequent statistical analysis revealed 12 basic work-related personality dimensions, listed and defined in Table 4.7. An example of a page from the actual PPRF job analysis booklet appears in Figure 4.9.

Each of the PPRF dimensions relates to one or more of the Big 5 personality dimensions (Digman, 1990) described in Chapter 3. A follow-up study (Raymark et al., 1997) demonstrated that because the PPRF correlated different personality requirements with different jobs, it could be used to distinguish among 260 different job titles. A “friendly disposition,” for example, was judged most valuable for sales clerk and cashier positions, and least valuable for janitorial occupations. For “thoroughness and attention to details,” personnel administration, management, and accounting occupations had the highest scores. “General trustworthiness” scores were considered most valuable for cashier and teller occupations. Recently, the developers of the PPRF have taken the next logical step in developing this area of application and constructed a self-report assessment device, called the *Employee Self-Descriptive Index* (2005), which allows applicants to describe their own personalities on the 12 dimensions covered by the PPRF. This instrument was developed by rewriting items that matched the 12 dimensions of the PPRF from a general personality item pool (Goldberg, 1999) and making them more-job related. Figure 4.10 presents some sample items from the ESDI self-report form. This permits an employer to match the personality characteristics required by a position (PPRF) with the personality characteristics of an applicant (ESDI). Tett and Burnett (2003) further emphasize the importance of personality-oriented job analysis, arguing that job demands favor certain personality characteristics and disfavor others.

Like cognitive task analysis, the PPRF and the ESDI are still too new to have much published research on applications. Nevertheless, like cognitive analysis, we are confident that they will see considerable use and make a clear contribution to the employer’s

Realistic job preview (RJP)
Technique for providing practical information about a job to prospective employees; includes information about the task and context of the work.

Personality-Related Position Requirements Form (PPRF)
Job analysis instrument devoted to identifying personality predictors of job performance.

TABLE 4.7 Twelve Personality Dimensions Covered by the PPRF

DIMENSION	DEFINITION
I. SURGENCY	
I-A: General leadership	A pattern of visibility and dominance relative to others; the tendency to initiate action, to take charge of situations or groups, to influence or motivate behavior or thinking of other persons or groups of people to bring about or maintain work effectiveness.
I-B: Interest in negotiation	An interest in bringing together contesting parties through mediation or arbitration of disputes or differences in view or, as a contesting party, deal or bargain with others to reach agreement, synthesis, or compromise; a style of leadership characterized by an ability and willingness to see and understand differing points of view, and an interest in making peace and achieving workable levels of harmony.
I-C: Achievement striving	A strong ambition and desire to achieve; in competition with others, a desire to win and a continuing tendency to exert effort and energy to win or to do better than others; in competition with one's self, a desire to exert effort to advance, to do better than one's own prior achievement in specific activities; a tendency to excel relative to others or to a personal standard; to go beyond what is expected and required in an attempt to become the best; not to accept satisfactory or good enough but to strive for excellent.
II. AGREEABLENESS	
II-A: Friendly disposition	A tendency to be outgoing in association with other people, to seek and enjoy the company of others; to be gregarious, to interact easily and well with others, to be likable and warmly approachable.
II-B: Sensitivity to interests of others	A tendency to be a caring person in relation to other people, to be considerate, understanding, and even empathic and to have genuine concern for others and their well-being.
II-C: Cooperative or collaborative work tendency	A desire or willingness to work with others to achieve a common purpose and to be part of a group; a willingness and interest in assisting clients and customers as a regular function of the person's work, or assisting co-workers as needed to meet deadlines or achieve work goals.
III. CONSCIENTIOUSNESS	
III-A: General trustworthiness	A pattern of behavior that leads one to be trusted by other people with property, money, or confidential information; a pattern of honoring the property rights of others and general concepts of honesty, truthfulness, and fairness; a deserved reputation for following through on promises, commitments, or other agreements—in short, a pattern of behavior that leads people to say approvingly, "This person can be counted on."
III-B: Adherence to a work ethic	A generalized tendency to work hard and to be loyal; to give a full day's work each day and to do one's best to perform well—following instructions and accepting company goals, policies, and rules—even with little or no supervision; an approach to work characterized by industriousness, purposiveness, persistence, consistency, and punctuality.
III-C: Thoroughness and attentiveness to details	A tendency to carry out tasks with attention to every aspect, including attention to details that others might overlook or perform perfunctorily; a meticulous approach to one's own task performance or the work of others, including careful inspection or analysis of objects, printed material, proposals, or plans.
IV. EMOTIONAL STABILITY	
IV-C: Emotional stability	A calm, relaxed approach to situations, events, or people; emotionally controlled responses to changes in the work environment or to emergency situations; an emotionally mature approach to potentially stressful situations with tolerance, optimism, and a general sense of challenge rather than of crisis; maturity in considering advice or criticism from others.
V. INTELLIGENCE	
V-A: Desire to generate ideas	A preference for situations in which one can develop new things, ideas, or solutions to problems through creativity or insight, or try new or innovative approaches to tasks or situations; to prefer original or unique ways of thinking about things.
V-B: Tendency to think things through	A habit of thinking, of mentally going through procedures or a sequence of probable events before actually taking actions; a tendency to seek information, to evaluate it, and to consider the consequences or effects of alternative courses of action.

Effective Performance in This Position Requires The Person to:		Not Required	Helpful	Essential
Set 1				
1) lead group activities through exercise of power or authority.		☐	☐	☐
2) take control in group situations.		☐	☐	☐
3) initiate change within the person's work group or area to enhance productivity or performance.		☐	☐	☐
4) motivate people to accept change.		☐	☐	☐
5) motivate others to perform effectively.		☐	☐	☐
6) persuade co-workers or subordinates to take actions (that at first they may not want to take) to maintain work effectiveness.		☐	☐	☐
7) take charge in unusual or emergency situations.		☐	☐	☐
8) delegate to others the authority to get something done.		☐	☐	☐
9) make decisions when needed.		☐	☐	☐
Set 2				
10) negotiate on behalf of the work unit for a fair share of organizational resources.		☐	☐	☐
11) work with dissatisfied customers or clients to achieve a mutually agreeable solution.		☐	☐	☐
12) help people in work groups settle interpersonal conflicts that interface with group functioning.		☐	☐	☐
13) help settle work-related problems, complaints, or disputes among employees or organizational units.		☐	☐	☐
14) negotiate with people outside the organization to gain something of value to the organization.		☐	☐	☐
15) mediate and resolve disputes at individual, group, or organizational levels.		☐	☐	☐
16) negotiate with people within the organization to achieve a consensus on a proposed action.		☐	☐	☐
17) mediate conflict situations without taking sides.		☐	☐	☐

FIGURE 4.9 A Sample Page from the PPRF
SOURCE: Guion (1998).

ability to understand the requirements of the job in question and match applicants to those requirements.

A Summary of the Job Analysis Process

It should be apparent from the preceding discussion that there is no one best way to perform a job analysis, but we can draw some conclusions about the process generally.

1. The more information one can gather from the greatest number of sources, the better one's understanding of the job is likely to be.
2. Molecular task-based analyses tend to be less useful for many purposes than worker- or behavior-based analyses.

Employee Self-Description Index™

On the following pages, you will find a list of statements. Each of these statements describes the behavior of some people. Any given statement may or may not be a good, accurate description of *your* behavior. Please use the Response Scale below to tell us how well each statement describes *you* and the way *you* do things. Describe yourself as you generally are now. **NOT** as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people that you know of the same sex and roughly your same age.

Response Scale:

	①	②	③	④	⑤
	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
I enjoy negotiating	①	②	③	④	⑤
I want every detail taken care of	①	②	③	④	⑤
I like to be part of a team	①	②	③	④	⑤
I can be counted on	①	②	③	④	⑤
I put work above pleasure	①	②	③	④	⑤
I value personal achievement	①	②	③	④	⑤
I can accept criticism without getting upset	①	②	③	④	⑤
I think of new ideas	①	②	③	④	⑤
I am not easily frustrated	①	②	③	④	⑤
I am always on time	①	②	③	④	⑤

FIGURE 4.10 Employee Self-Description Index

- Most job analyses should include considerations of personality demands and work context; some job analyses should also include considerations of purely cognitive tasks.

Computer-Based Job Analysis

As we mentioned earlier, many consulting companies and larger employers are using computer-based job analysis systems. Such systems provide a number of advantages. The first is time and convenience to the employer. SMEs need not be assembled in one spot at one time as is often the case with traditional job analysis; they can work from their desks at their own pace and submit their responses electronically. A second advantage is the efficiency with which the expert system can create reports. The reports can serve a wide range of purposes, from individual goal-setting and performance feedback to elaborate person-job matches to support selection and placement strategies. Finally, since systems like this use the same taxonomies and processes across jobs, they make it easier to understand job similarities and career paths, thus facilitating vocational counseling and long-term strategic HR planning in the form of replacement charts for key positions. Possible shortcomings of such systems, of course, are the same shortcomings that would be apparent with more traditional paper and pencil-based systems. If the data being collected are poor, or the task or human attribute taxonomies are flawed or irrelevant, then the results, reports, and decisions made on the basis of that system will also be flawed or irrelevant.

O*NET

In the early 1930s, the federal government introduced a program to match applicants with job openings (Droege, 1988; Dunnette, 1999). It was up to each local office to develop its own occupational information base; since these bases were local, there could be little collaboration among the network of offices. Accordingly, in 1934 efforts were begun to standardize these services and develop a national database. The cornerstone of this effort was a program of job analysis and by 1939, 54,000 job analyses had been completed and the first *Dictionary of Occupational Titles (D.O.T.)* was published. One of the major purposes of the *D.O.T.* was, and still is, for use in occupational counseling.

In 1991, the last year of its publication, the *D.O.T.*'s fifth edition contained information on more than 13,000 occupations (Dunnette, 1999). By this time the *D.O.T.*, at least in the form of its fifth edition, had become less useful. The primary reason for this was its heavy dependence on task-based information, with no direct link to human abilities or attributes. As we have seen, task-based descriptions of occupations provide limited value in work environments with shifting job boundaries. Further, each revision of the *D.O.T.* was expensive and time consuming. A decision was made to change both the format and the content of the *D.O.T.* (Dunnette, 1999).

In 1995 the federal government introduced the concept of an electronic database to replace the *D.O.T.* The database was called the **Occupational Information Network** or **O*NET** (Dye & Silver, 1999; Peterson et al., 2001). O*NET is actually a collection of databases. Figure 4.11 highlights those sections that are mentioned earlier in this chapter, as well as in Chapter 3 on individual differences and assessment. All of O*NET's six major databases are still being developed and completed. When O*NET is completed, information describing each job in the system will be available for each of the six databases. In addition, expert computer systems allow the databases to be combined in ways that will facilitate person-job matches, the same goal set for the original *D.O.T.* in 1939. Thus, if you were interested in pursuing a career as a jet engine mechanic, you could enter O*NET with the job code for jet engine mechanic, and get information on variables such as

Dictionary of Occupational Titles (D.O.T.) Document that includes job analysis and occupational information used to match applicants with job openings; a major purpose of the *D.O.T.* was, and still is, for use in occupational counseling.

Occupational Information Network (O*NET) Collection of electronic databases, based on well-developed taxonomies, that has updated and replaced the *Dictionary of Occupational Titles (D.O.T.)*.

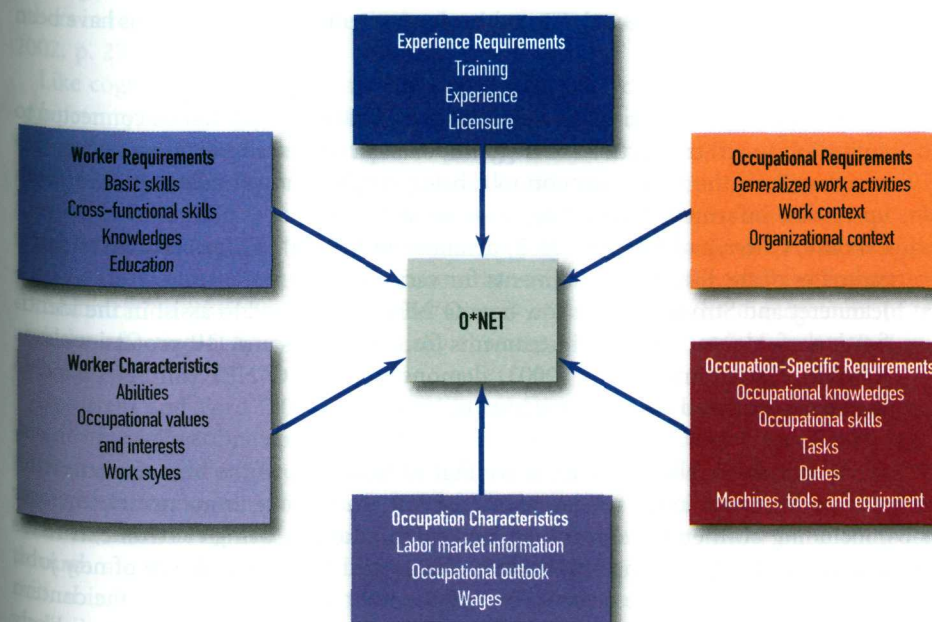


FIGURE 4.11 Databases Forming the Foundation for O*NET

SOURCE: Mumford & Peterson (1999).

experience requirements, work context, typical tasks and duties, wage expectations, requisite abilities, and basic skills. And you could get all of this information in seconds while sitting at your own computer. Furthermore, unlike the old printed *D.O.T.*, O*NET can be updated instantaneously as changes occur in the labor market, technology, or training and experience requirements.

In addition to the transformation from a print medium (*D.O.T.*) to an electronic medium (O*NET), an even greater change occurred in content. Each of the O*NET databases is now based on well-developed taxonomies, such as the Fleishman taxonomy for abilities we described in Chapter 3. O*NET was not designed as a job analysis system, but it will have the capability to compare a new job to its current job base and identify jobs most similar to that new job. This matching process will, in turn, permit instantaneous access to a description of the new job's probable requisite abilities, knowledge, and other human attributes. It would also make it possible to fit the job into other labor market databases, including estimates of the probable worth or initial wage estimate for that job.

Not all jobs and job families have yet been entered into the O*NET databases, but when the system is complete, it is expected to meet at least the following needs:

- Identifying occupational skill standards common to clusters of occupations, or job families.
- Facilitating school-to-work transitions by linking educational programs to occupational standards.
- Assisting laid-off workers in finding re-employment through job search assistance, labor market information, and training.
- Assisting employers in building high-performance workplaces by providing information about the business practices associated with existing high-performance workplaces (adapted from Peterson, Borman, Hansen, & Kubisiak, 1999).

As you can see, O*NET can serve multiple users, including workers looking for jobs or occupations, employers looking for workers, or I-O psychologists serving as consultants to organizations—or even students in I-O psychology courses interested in examining job descriptions for various occupations.

Since the development of the O*NET architecture, several novel applications have been described:

- Carter, Dorsey, and Niehaus (2004) demonstrate how O*NET can be connected to online job search transactions to trigger updates in job requirements and other factors, based on the most common jobs being sought, and provide applicants with up-to-date information regarding those requirements.
- LaPolice, Carter, and Johnson (2005) demonstrate how O*NET can be used to derive estimates of the literacy requirements for various jobs.
- Jeanneret and Strong (2003) show how O*NET can be used to assist in the identification of relevant selection instruments for consultants and HR professionals.
- Johnson, Carter, and Dorsey (2003) demonstrate how O*NET can be applied to derive occupational ability requirements.

O*NET is a broad public policy initiative that embodies all of the best characteristics of defining performance in the modern workplace. It is accessible to many different user groups, including both employees and applicants. In addition, being electronic, it lends itself to quick updating of changes in existing jobs as well as the appearance of new jobs. Much work remains before the database is complete, but when that is done, the content and format will guarantee its value and relevance for many decades. This system is likely

to be in place and continue to grow in value over your active work life. Because it is developed primarily by I-O psychologists doing “good work,” those interested in I-O psychology will be interested in it.

One need not have a license or certificate to access O*NET, and it is surprisingly user friendly. We suggest that you simply click on the web address (online.onetcenter.org/) and give it a whirl. Enter a particular job title (e.g., Customer Greeter or University Professor or Prison Guard) and click on the first occupational title listed. This lets you through the front door of O*NET; once inside, you are free to explore aspects of the job as diverse as tasks, wages, and related occupations.

Competency Modeling

We introduced the concept of competencies in the discussion of individual differences and assessment (see Chapter 3). In this section we will deal with competencies from a different perspective: the process of **competency modeling**. You will recall that we defined competencies as “sets of behavior that are instrumental in the delivery of desired results or outcomes” (Kurz & Bartram, 2002). We further described competencies as being rooted in a context of organizational goals rather than in an abstract taxonomy of human attributes.

Just as job analysis seeks to define jobs and work in terms of the match between required tasks and human attributes, competency modeling seeks to define organizational units (larger entities than simply jobs or even job families) in terms of the match between the goals and missions of those units and the competencies required to meet those goals and accomplish those missions. Thus, competency modeling is a natural extension of the job analysis logic rather than a replacement for job analysis. It is competency modeling that has the power to connect individual behavior with organizational viability and profitability. The competency modeling approach “emphasizes the characteristics desired across all individuals and jobs within an organization . . . these more global competencies are expected to not only predict behavior across a wide variety of tasks and settings but also provide the organization with a set of core characteristics that distinguish the company from others in terms of how it operates its business and treats its employees” (Goldstein & Ford, 2002, p. 272).

Like cognitive task analysis and the Personality-Related Position Requirements Form, competency modeling goes beyond traditional job analysis by recognizing that work and the workplace are in a state of rapid evolution. Sanchez and Levine (1999) provided an example. In considering the job title “quality auditor,” a traditional job analysis might suggest that the “ability to perform accurate numerical calculations involving unit transformations” and “knowledge of relevant standard operating procedures” would be important KSAOs. Competency modeling, in contrast, might identify the need for “constructive communication involving nontechnical aspects of the job like the management of trust and the effective delivery of potentially threatening information” (Sanchez & Levine, 1999, p. 58).

Goldstein and Ford (2002) presented examples of two different approaches to competency modeling. One approach is to identify outstanding performers and analyze their performance and competencies. The employer could then take that home-grown taxonomy of performance components and competencies and use it as a model for the match between individuals and organizationally relevant work. This might be accomplished through a combination of traditional job analysis techniques, such as observation and critical incident interviews, with the addition of newer techniques such as cognitive task analysis and think-aloud protocols.

Competency modeling

Process that identifies the characteristics desired across all individuals and jobs within an organization; these characteristics should predict behavior across a wide variety of tasks and settings, and provide the organization with a set of core characteristics that distinguish it from other organizations.

In contrast to this process, a second approach is that of using mission statements and corporate goals as the foundation for competency modeling. This approach was in fact adopted by Intel Corporation, which tied it to identifying employee competencies compatible with the corporation's core values. These values were: (1) taking risks and challenging the status quo; (2) emphasizing quality by setting high goals; (3) demonstrating discipline in project planning, meeting commitments, and conducting business with a high level of integrity; (4) serving customers by delivering innovative and competitive products as well as communicating expectations in a clear and timely fashion; (5) being results oriented; and (6) working as a team that has mutual respect for its members (Goldstein & Ford, 2002; Meister, 1994).

Competency modeling is not without its critics (Lievens, Sanchez, & De Corte, 2004; Pearlman, 1997; Sanchez & Levine, 2001). Much if not most of the criticism is about the definitions of competencies, although work by people like Bartram (2005) addresses those issues. In addition, some have criticized the apparent lack of agreement between the results of traditional job analyses and those of competency modeling. Lievens et al. (2004) argue that rather than asking which method—job analysis or competency modeling—is *better*, it is more useful to *combine* the job analysis and competency modeling processes. We agree.

Competency modeling represents the evolution of work analysis along the lines suggested by Campbell's (1990a) study of performance components; it addresses the issue of what organizations pay people to do. In the past, traditional task-oriented job analysis often stopped short of considering the strategic goals of the organization. There was a link missing between human behavior and organizational goals. Lievens, Sanchez, and colleagues (2004) provide that link. In some senses, motivation theories attempted to fill that gap, as we will see in Chapter 8. But as we suggested in Chapter 1, I-O practice and theory need to be unified rather than fragmented. It is not enough to place the burden for the link between behavior and organizational success on the shoulders of one process (e.g., motivation of employees or methods of selection or job analysis). Instead, the link should be apparent in many different approaches, including job, work, and competency analysis. By directly addressing the needs and the goals of the organization, competency modeling helps to reinforce that link. Recent publications (e.g., Pearlman & Sanchez, 2009) have adopted new terms for what has been called competency modeling—strategic work analysis or strategic job analysis. This is a good replacement since it both identifies what is new (i.e., strategic) and avoids the debate about what is and what is not a competency. It is likely that these new terms will catch on rapidly.

MODULE 4.4 SUMMARY

- Electronic performance monitoring facilitates the gathering of job analysis information independent of what might be collected from subject matter experts (SMEs). Although electronic performance monitoring can be very cost effective and has the potential for providing detailed and accurate work logs, it is often unpopular with workers.
- Cognitive task analysis can provide a valuable addition to traditional job analysis procedures. Most job analyses concentrate on observable behavior, but special data collection techniques must be used for cognitive behavior because it is not directly observable. Because cognitive task analysis concentrates on *how* behavior occurs rather than on *what* is accomplished, it is a useful addition to the job analysis toolbox.
- Historically, job analysis instruments ignored personality attributes, concentrating on abilities, skills, and, less frequently, knowledge. A recently developed job analysis instrument (the Personality-Related Position Requirements Form) identifies personality predictors of job performance.
- The *Dictionary of Occupational Titles (D.O.T.)* was developed to provide a national database of jobs and job analysis information. In 1995 the federal government supplanted the *D.O.T.* with the Occupational Information Network, or O*NET, which is a collection of databases that contains information on experience requirements, work context, typical tasks and duties, wage expectations, requisite abilities, and basic skills.
- Just as job analysis seeks to define jobs and work in terms of the match between required tasks and human attributes, competency modeling seeks to define organizational units in terms of the match between the goals and missions of those units and the competencies required to meet those goals and accomplish those missions. Thus, competency modeling is a natural extension of the job analysis logic rather than a replacement for job analysis.

KEY TERMS

electronic performance monitoring	realistic job preview (RJP)	Occupational Information Network (O*NET)
cognitive task analysis	Personality-Related Position Requirements Form (PPRF)	competency modeling
think-aloud protocol	<i>Dictionary of Occupational Titles (D.O.T.)</i>	
context of the work		

MODULE 4.5

Job Evaluation and the Law

Job Evaluation

In determining how to pay individuals within an organization, employers must consider at least two perspectives. The first is the external perspective, that is, what the marketplace is paying for people who hold particular job titles: What pay rate would be considered “equitable” by an applicant or incumbent compared to the going market rate? All other things being equal, an incumbent or candidate is more likely to be attracted to a higher-paying than a lower-paying position. The second perspective is an internal one. The organization has a fixed amount of money to distribute to its employees. How will that fixed amount be divided? When individuals compare themselves to other employees of the same organization, will they consider themselves “equitably paid”? **Job evaluation** is a method for making these internal decisions by comparing job titles to one another and determining their relative merit by way of these comparisons. In most systems, there are pay ranges within a job title or category, allowing managers to make adjustments for the market, or for a particular incumbent with a special skill or knowledge.

Like traditional task-oriented job analysis, job evaluation represents more a view of the past than of the future, and for many of the same reasons. The procedures and principles are well described in many traditional personnel administration guides, such as *Elements of Sound Base Pay Administration*, published jointly by the Society for Personnel Administration and the American Compensation Association (1981). Job evaluation techniques are too varied and complex for a detailed treatment in an introductory text such as this one. For the student interested in job evaluation, these techniques are covered in great detail in contemporary HR textbooks (e.g., Cascio, 2006; Jackson, Schuler, & Werner, 2009).

In the past, compensation was viewed in terms of tasks and jobs. Most job evaluation systems identify what they call **compensable factors**. These factors usually include skills, responsibility, effort, and working conditions. With the changing theories of work as well as the structural and technological changes that are occurring in the workplace, it is becoming more common to think of work roles, competencies, human attributes, and team responsibilities than tasks or the traditional compensable factors, such as responsibility or effort. Heneman, Ledford, and Gresham (2000) present a thoughtful treatment of the challenges of modern compensation systems.

Job evaluation Method for making internal pay decisions by comparing job titles to one another and determining their relative merit by way of these comparisons.

Compensable factors Factors in a job evaluation system that are given points that are later linked to compensation for various jobs within the organization. Factors usually include skills, responsibility, effort, and working conditions.

Some recent studies provide interesting observations about cognitive ability and emotional labor. (Emotional labor is the need to control one’s emotions on the job, and we will discuss it more fully in Chapter 9.) Rotundo and Sackett (2004) found that regardless of what employers said, a great deal of the differences in pay rates and compensation can be attributed to the need for cognitive ability in the job. Interestingly, when Glomb, Kammeyer-Mueller, and Rotundo (2004) looked at the compensation levels of workers engaged in emotional labor (such as telemarketers and retail sales reps), they found that among jobs involving emotional labor, only those that also required high cognitive ability were well paid. If the cognitive demands were low, then the pay for emotional labor was also low. Research conclusions match the themes we have been following throughout this chapter: Modern employers need to link their compensation systems more closely to the strategic goals of their organization. In the case of emotional labor, if it is closely tied to the “essential function” of the organization, it should play a significant role in compensation independent of the need for cognitive ability.

The Concept of Comparable Worth

Comparable worth is a phrase that contains practical, philosophical, social, emotional, and legal implications. To most people, it has become shorthand for the idea that people who are performing comparable work should receive comparable pay, reflecting the fact that their worth to the organization in terms of tasks accomplished is “comparable.” That is the practical implication of the term. Various experts have suggested the use of internal controls (e.g., job evaluation) and external controls (e.g., salary surveys) to assure this comparability, or the use of job evaluation techniques to calibrate the pay levels of various jobs in an organization and thus assure at least some internal comparability.

The problem with this concept is arriving at a definition of “comparable work.” Should this be defined based on skills and abilities required for the work, tasks assigned to the job title, experience and education required, competencies required, or roles filled? If it were simply based on abilities and skills utilized in the job, one might expect a loading dock supervisor and a librarian to be paid similarly because they both check things in and out of their respective work locations, use inventory lists, and record the movements of material. If it were based on tasks assigned, one would expect a librarian in town A to be paid comparably to a librarian in town B, but you would not necessarily expect any comparability between the job of a loading dock supervisor and the job of a librarian.

The comparable worth concept has involved a great deal of debate regarding the relative pay levels of men and women. The question is whether or not women are, or can legitimately be, paid less than men for the “same” work. Thus, the phrase “comparable worth” has taken on legal and social policy meanings well beyond the process of calibrating pay scales within an organization. The **Equal Pay Act of 1963** requires “equal pay for equal work.” Equal work has usually been defined in terms of similar or identical job titles. Consider the example of an accounting department in a retail business. One subsection is devoted to billing (accounts receivable), while the other subsection is responsible for paying vendors or suppliers (accounts payable). Let’s assume that workers in the accounts receivable subsection are predominantly male, and that they are paid at a higher scale than the accounts payable employees, who are predominantly female. The female employees in accounts payable might justifiably argue that their work is comparable to that of the males in accounts receivable, and therefore they are entitled to comparable compensation. The company might respond that the value of the work of the accounts receivable subsection is considerably greater than the value of the work of the accounts payable department and use a job evaluation analysis to support its position. But the job evaluation process itself might be

Comparable worth Notion that people who are performing jobs of comparable worth to the organization should receive comparable pay.

Equal Pay Act of 1963 Prohibits discrimination on the basis of sex in the payment of wages or benefits, where men and women perform work of similar skill, effort, and responsibility for the same employer under similar working conditions.

criticized, either for using the mechanics of the process to prop up long-standing patterns of discrimination (Trieman & Hartmann, 1981) or for being subject to various biasing influences that might creep into each stage of the job evaluation process (Arvey, 1986).

In the end, the comparable worth issue is about the social value of fairness, not just about the mechanics of a process such as job evaluation. It is about the motives and potential biases of decision makers and, as such, is more likely to be resolved on a case-by-case basis by judges or juries than by science. Strober (1994) suggests that for women who want to earn as much as or more than men, the answer is clear—enter male-dominated occupations. But why should a woman have to accept jobs in hazardous waste cleanup or installing telephone lines to approach the annual earnings of men (Associated Press, 2004)? The issue is less about job evaluation than about social justice. Rynes and Gerhart (2001) provide an excellent treatment of general compensation issues as well as the more specific issues associated with comparable worth arguments.

Job Analysis and Employment Litigation

Title VII of the Civil Rights Act of 1964 Federal legislation that prohibits employment discrimination on the basis of race, color, religion, sex, or national origin, which define what are known as protected groups. Prohibits not only intentional discrimination, but also practices that have the unintentional effect of discriminating against individuals because of their race, color, national origin, religion, or sex.

In the decades since the passage of **Title VII of the Civil Rights Act of 1964**, job analysis has occupied a central role in employment discrimination lawsuits for several reasons. In all trials, criminal or civil, there is a heavy dependence on the chain of evidence. In employment litigation, this chain means a series of links or connections between a test score and a predicted level of performance. We examined these links in some detail in Chapter 2 when we discussed models of validation. Traditional task-oriented job analysis has often been accepted as a necessary, although not sufficient, condition for establishing the validity of selection tests. In other words, while a competent job analysis would not guarantee that a test would be found valid, the *absence* of a credible job analysis might be enough to doom any claim of job relatedness. How could a test be job related if the testing agent did not know what the critical tasks of the job were? The *Uniform Guidelines on Employee Selection Procedures* (1978) explicitly require that a demonstration of validity include some connection between the job tasks or responsibilities and the test used to select people for that job. A job analysis is a way of providing that connection.

Despite the fact that acceptable methods of job analysis have been recognized for decades, court cases dealing with employment discrimination even today often dissolve into arcane and mind-numbing arguments about the adequacy of SMEs or the missing link between a test question and a job task. Landy (1986) has likened the arguments to those of the scribes in biblical times who sat outside the temple doors, interpreting scripture to determine whether or not a sin had been committed. The *Uniform Guidelines* were published in 1978, long before the advent of globalization, digitization, teamwork, validity generalization, performance models such as Campbell's, cognitive task analysis, and competency modeling. As a result, the gap between the evolution of I-O psychology and the *Uniform Guidelines* continues to grow. This creates a problem of interpretation or extrapolation if only the guidelines are used for evaluation of a validity design. Since employers must still recognize the controlling power of the *Uniform Guidelines*, it is important to show how these guidelines can be interpreted as consistent with current needs and practice. This is the joint responsibility of the I-O psychologist and the employer. Fortunately, SIOP continues to update HR scientific knowledge and principles for test validation. A revision of the SIOP Principles was published in 2003. Thus, the best suggestion for an employer is to be aware of the *Uniform Guidelines* as well as the 2003 revision of the SIOP Principles and to use both documents to evaluate the adequacy of a validity design. It is likely that there will always be a role for some traditional form of job analysis such as a task or human attributes-based analysis; the addition of the newer and

more vibrant extensions such as competency modeling, cognitive task analysis, and performance components to facilitate strategic planning will enhance the results of a job analysis even more.

Additional factors that may enter into a legal argument are comparable worth (see discussion above) and overtime pay. In the past ten years, more and more workers who are in supervisory positions have filed lawsuits to recover pay that they argue is due to them for overtime work. The Fair Labor Standards Act (FLSA) identifies certain organizational jobs that do not require overtime pay, including jobs in "management." But the distinction between management and non-management positions gets a bit fuzzy when you look at first-level supervisors. Consider a McDonald's shift manager, who may serve customers, cook french fries, and even mop floors, to help those who report to her and to speed customer service. If the manager engages in those tasks, is she still doing "management" and thus exempt from overtime pay? As another example, Wal-Mart faced dozens of lawsuits in almost 30 states in which assistant managers challenged their exempt (from overtime) status (Zimmerman, 2004). The economic stakes are high. In 2001, Farmer's Insurance was required to pay over \$90 million in back pay for overtime to agents whom the company had misclassified as exempt. Although it is only recently that I-O psychologists have been called upon to assist in these cases, their role is a logical one. Traditional job analysis techniques are very good at identifying the importance of individual tasks and the frequency with which they are performed. In these overtime pay lawsuits, the issue is usually not whether a single task (e.g., waiting on a customer) is performed occasionally, but rather whether tasks that would be part of non-exempt jobs (thus deserving of overtime) make up more than 50 percent of the job in question. This is where job analysis comes in. By analyzing the jobs in question, it is possible for an I-O psychologist to provide a quantitative answer to that question. Banks and Cohen (2005) provide a roadmap of how I-O psychologists might help resolve overtime disputes. At the heart of this roadmap, however, is job analysis.

MODULE 4.5 SUMMARY

- In determining how to pay individuals within an organization, employers must consider two perspectives. The first is the external perspective: How does the pay rate compare to the going market rate? The second perspective is internal, one that can be addressed by job evaluation or by comparing job titles to one another and determining their relative merit by way of these comparisons.
- Most job evaluation systems identify compensable factors, which usually include skills, responsibility, effort, and working conditions. With the changing theories of work and the structural and technological changes occurring in the workplace, organizational decision makers are increasingly thinking of work

roles, competencies, human attributes, and team responsibilities rather than tasks or the traditional compensable factors such as responsibility or effort.

- Since the passage of Title VII of the Civil Rights Act of 1964, job analysis has occupied a central role in employment discrimination lawsuits. Traditional task-oriented job analysis has often been accepted as a necessary, although not sufficient, condition for establishing the validity of selection tests. Thus, although a competent job analysis would not guarantee that a test would be found valid, the absence of a credible job analysis might be enough to doom any claim of job relatedness. Lawsuits may also involve issues such as comparable worth and overtime pay.